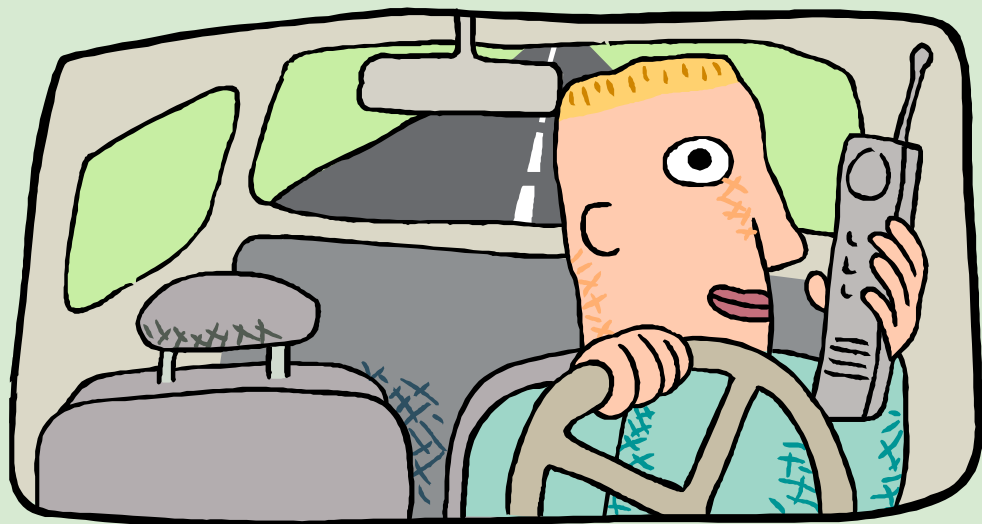


Mobile Phone Use while Driving

Conclusions from four investigations

*Hans Thulin
Susanne Gustafsson*





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Referat (bakgrund, syfte, metod, resultat) max 200 ord: <p>I en undersökning, utförd på uppdrag av Vägverket, har syftet varit att ge en bild av förarens användning av mobiltelefon under körning och vilka beteenden och vanor som finns samt vilka inställningar som finns till användning av mobiltelefonen under körning. Ett ytterligare syfte var att få en uppfattning om antalet trafikolyckor och skade- och dödsfall som orsakas av mobiltelefonpratande bilförare. I undersökningen sammanfattas resultat från den nationella enkätbaserade trafiksäkerhetsundersökningen TSU92-, en mindre litteraturstudie, två diskussioner i fokusgrupper och en enkätstudie.</p> <p>Studien visar att bilförarnas användning av mobiltelefonen i samband med bilkörning har ökat och att tre fjärdedelar av bilförarna har tillgång till mobiltelefon. Av mobiltelefonerna som användes var 75 % av typen handhållen utan extra utrustning. Det genomsnittliga antalet ringda eller mottagna samtal då föraren körde sin bil var 1,1 per dygn. Det förekom också, företrädesvis i ungdomsgruppen, att förare skickade eller mottog textmeddelanden.</p> <p>Som regel vidtog föraren någon form av försiktighetsåtgärd i samband med mobilsamtal. Kvinnor iakttog oftare försiktighetsåtgärder än män och äldre förare oftare än yngre.</p> <p>Användning av mobiltelefonen påverkade körningen på olika sätt. Förarna missade avfarter, omslag vid rödlys och "glömde av" hastigheten. Det var inte ovanligt att incidenter, nära kollisioner med andra fordon eller föremål eller avåkning inträffade då mobiltelefonen användes under färd.</p> <p>Tryggheten i att alltid kunna bli nådd och att kunna nå andra var den dominerande orsaken till att man hade mobiltelefonen med sig i bilen.</p>		
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Preface

This research on the use of mobile phones while driving has been funded by the Swedish National Road Administration, SNRA. Ruggero Ceci has been contact person for SNRA.

The results are fully reported in Swedish during 2003 as VTI notat, see VTI notat 21, 22 and 23. Hans Thulin has been the project leader and has authored the report together with Susanne Gustafsson.

Jerker Sundström, VTI, has studied the content of the document and presented his findings at a seminar at VTI. Rein Schandersson, VTI, has proof-read the report.

I would like to thank everyone who has in anyway helped to make this project possible.

Linköping, December 2003

Hans Thulin

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Mobile Phone Use while Driving. Conclusions from four investigations

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Summary

The study shows that 73 % of all drivers in Sweden had access to a mobile phone in 2001. The use of mobile phones affected driving in different ways. Drivers missed exits, failed to observe traffic signals, and forgot to adjust the speed according to the limit. It was not unusual with incidents or near collisions with other vehicles or objects, or driving off the road, when mobile phones were used while driving. The dominant reason for the driver to have a mobile phone in the car was the security of always being able to contact or be contacted. According to our estimates, 100,000 drivers each year use the mobile phones to contact the police or call an ambulance after an accident. According to our theoretical estimates, approximately 10–20 people die in traffic accidents in Sweden each year as a consequence of drivers' use of mobile phones while driving.

This research has been requested by the Swedish National Road Administration. The purpose was to give a picture of drivers' use of mobile phones while driving and more specifically their attitudes to the use of mobile phones while driving and the types of routines and behaviour practised when using the mobile phones. In addition, the purpose was to get some idea of the number of traffic accidents, along with injuries and deaths, which were caused by drivers using their mobile phones.

The report summarises results from the national questionnaire-based Traffic Safety Survey TSU92-, a short literary review, two focus group discussions and a questionnaire survey.

The number of mobile phone users has increased heavily and accelerated in the last ten years. This increase is reflected in drivers' use of mobile phones while driving. Results from the Traffic Safety Survey show that 73 % of all drivers had access to a mobile phone in 2001. These drivers accounted for 85 % of all yearly mileage. Of the mobile phones, 75 % were hand-held without any extra add-on equipment. Hand-held mobile phones were most common among younger and older drivers. 30 % of all drivers with mobile phones used them daily while driving.

The average number of drivers' incoming or out-going calls while driving was, according to results from the questionnaire survey, 1.1 per day. A significant number of drivers reported that they often or almost always stopped their car when they were going to use their mobile phone.

As a rule, the driver generally took some kind of safety precaution in conjunction with a mobile phone call. Women stated that they used safety measures more often than men and older drivers more often than younger.

Drivers sometimes also send and receive text messages, SMS, while driving. Generally, this is often a driver from the younger age group.

The use of mobile phones affected driving in different ways. Drivers missed exits, failed to observe traffic signals, and forgot to adjust the speed according to the limit. It was not unusual with incidents or near collisions with other vehicles or objects, or driving off the road, when mobile phones were used while driving.

The respondents in the questionnaire survey considered hands-free equipment to be significantly less risky to use than hand-held mobile phones. A third of the respondents favoured a law against use of mobile phones while driving, regardless of the type of mobile phone equipment. Half of all respondents thought that hand-held mobile phones should be forbidden to use during driving. The common answer was that the potential accident risk rate associated with use of hand-held mobile phones was much higher than for hands-free equipment. The drivers who generally use hands-free equipment especially pointed out this risk factor.

The dominant reason for the driver to have a mobile phone in the car was the security of always being able to contact or be contacted by someone else. According to our estimates, 100,000 drivers each year use the mobile phones to contact the police or call an ambulance after an accident. According to our theoretical estimates, approximately 10–20 people die in traffic accidents each year as a consequence of drivers' use of mobile phones while driving.

Användning av mobiltelefon vid bilkörning

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Sammanfattning

År 2001 hade 73 % av bilförarna tillgång till mobiltelefon och av dessa använde 30 % den i sitt dagliga resande. I enkätstudien framkom att användningen påverkade körningen på olika sätt såsom missade avfarter, hastighetsförändringar, nära kollisioner eller avåkningar. Tryggheten i att alltid kunna bli nådd och att kunna nå andra var den dominerande orsaken till att man hade mobiltelefon med sig i bilen. Ett resultat av enkätstudien är att vi uppskattar att 100 000 bilförare årligen tillkallar polis eller ambulans med den medhavda telefonen. Samtidigt ger våra teoretiska uppskattningar ett dödstal på ungefär 10–20 personer som följd av att bilföraren pratar i mobiltelefon under färd.

Föreliggande undersökning har genomförts på uppdrag av Vägverket. Syftet har varit att ge en bild av förarens användning av mobiltelefon under körning och vilka beteenden och vanor som finns vid användning av mobiltelefon under körning, likaså vilka inställningar som finns till användning av mobiltelefonen under körning. Ett ytterligare syfte var att få en uppfattning om antalet trafikolyckor och skade- och dödsfall som orsakas av mobiltelefonpratande bilförare.

Undersökningen sammanfattar resultat från den nationella enkätbaserade trafiksäkerhetsundersökningen TSU92-, en mindre litteraturstudie, två diskussioner i fokusgrupper och en enkätstudie.

Antalet användare av mobiltelefon har ökat kraftigt och accelererat under den senaste tioårsperioden. Detta gäller också bilförarnas användning av mobiltelefonen i samband med bilkörning. Resultat från trafiksäkerhetsundersökningen visar att år 2001 hade 73 % av bilförarna tillgång till mobiltelefon. Dessa förare svarade för 85 % av bilparkens totala årliga trafikarbete. Av mobiltelefonerna som användes var 75 % av typen handhållen utan extra utrustning. Handhållna mobiltelefoner var vanligast bland yngre och äldre bilförare. Av de förare som hade tillgång till mobiltelefon använde 30 % mobiltelefonen i sitt dagliga resande.

Det genomsnittliga antalet ringda eller mottagna samtal då föraren körde sin bil var, enligt resultat från enkätstudien, 1,1 per dygn. En inte obetydlig andel av förarna angav att de ofta eller nästan alltid hade stannat sin bil då de skulle använda mobiltelefonen.

Som regel vidtog föraren någon form av försiktighetsåtgärd i samband med mobilsamtal. Kvinnor iakttog oftare försiktighetsåtgärder än män och äldre förare oftare än yngre.

Det förekom också att förare skickade eller tog emot textmeddelanden, SMS, under körning. Det gällde företrädesvis bilförarna i ungdomsgruppen.

Användning av mobiltelefonen påverkade körningen på olika sätt. Förarna missade avfarter, omslag vid rödlys och "glömde av" hastigheten. Det var inte ovanligt att incidenter, nära kollisioner med andra fordon eller föremål eller avåkning, inträffade då mobiltelefonen användes under färd.

Respondenterna i enkätstudien ansåg att handfri utrustning var betydligt mindre riskfyllt att använda under färd än handhållen mobiltelefon. En tredjedel av respondenterna ansåg att det borde vara förbjudet för föraren att använda mobiltelefon under färd, oavsett handfri utrustning eller inte. Hälften av respondenterna ansåg att handhållen mobiltelefon borde vara förbjudet för föraren att använda under färd. Olycksrisken ansågs vara betydligt högre då man använde handhållen mobiltelefon jämfört med att använda handfri utrustning. Den ökade olycksrisken markerades ytterligare av de förare som vanligen använde handfri utrustning.

Tryggheten i att alltid kunna bli nådd och att kunna nå andra var den dominerande orsaken till man hade mobiltelefonen med sig i bilen. Som ett resultat av enkätstudien uppskattas att 100 000 bilförare årligen tillkallar polis eller ambulans med den mobiltelefon man har med sig i bilen. Enligt våra teoretiska uppskattningar är det ungefär 10–20 personer som dödas i trafikolycka varje år som följd av att bilföraren pratade i mobiltelefonen under färd.

1 Background

The use of mobile phones in Sweden has increased substantially during the 1990's. In the end of the year 2001, the number of mobile phone subscribers (including active pre-paid subscriptions) was 7,158,000 (SIKA, 2003). That can be compared with the number of mobile phone subscriptions in the end of 1994, which was 1,381,000. This means a 400 % increase over a 7 year period. The yearly growth rate was approximately 30 % in mid 1990's. However, the growth rate was just below 13 % for the year 2001. The traffic volume for the year 2001, measured in minutes, was 5,466 million minutes (SIKA, 2003). The traffic volume for 1997 was 2,553 million minutes, which means an increase over a four year period with 114 %. During 2001, the increase was 15 %.

Information concerning the number of subscriptions and mobile phone usage in general cannot be used to determine access to and use of mobile phones while driving. However, there is every reason to believe that the usage of mobile phones while driving has increased significantly and there is limited information of the effects on traffic safety caused by the increase.

This study, financed by the Swedish National Road Administration, seeks to determine how often mobile phones are used while driving and the types of routines and behaviour practiced when drivers use mobile phones. The study has been reported in full detail in Swedish in three VTI notices. Thulin (2003a) identifies the use of mobile phones while driving according to hours per person and kilometres per person and reports on a literary review of the relationships between accident risks and use of mobile phones while driving. Gustafsson (2003) reports on two focus group discussions with mobile phone users that were held in order to gather information via a qualitative method on mobile phone usage in general as well as the drivers' perspective. Thulin (2003b) also reports on a questionnaire survey given to drivers with the purpose of identifying actual behaviour and habits of drivers using mobile phones while driving.

2 Purpose

The purpose of this study is to examine drivers' use of mobile phones while driving and the routines and behaviour of the driver when using a mobile phone. In addition, the drivers' involvement in accidents and potential accident risks associated with mobile phone usage are examined.

3 Methods and procedures

This chapter summarises the different methods used to investigate the use of mobile phones while driving.

3.1 Traffic Safety Survey TSU92-

In order to start the process of determining the use of mobile phones while driving, data were used from the Swedish National Road Administration's and VTI's Traffic Safety Survey TSU92-. This survey is based on a daily distribution of questionnaires, continuously since 1992, to randomly selected individuals in the Swedish population. The maximum age of the respondents is 85 (population = 8.6 million). Response ratio from TSU92- is somewhat over 50 %. The questionnaire studies the exposure of people in the Swedish traffic environment with focus on traffic safety. Starting 1998, two additional questions were added to the questionnaire concerning access to and use of mobile phones while driving. An additional question was added in 2001 concerning the type of mobile phone used – hands-free or hand-held. The data collected via TSU92- concerning access to and usage of mobile phones while driving has been analysed earlier and documented in a report (Thulin & Ljungblad, 2001). Access to and usage of mobile phones was defined in that report as hours per person and kilometres per person.

The present report covers the period from April 1998 to March 2002. The first year of the survey is called 1998 and includes responses from April 1998 to March 1999. The last year covered is from April 2001 to March 2002 and is called year 2001. The material includes 24,926 respondents aged 18 to 84 years. Of these respondents, 10,698 were licensed drivers. The majority of drivers, 9,840, drove privately owned cars. The rest were in descending order, drivers of company owned cars, light trucks, heavy trucks, busses, and taxis. All these licensed drivers are referred to in this report as drivers. The drivers were divided into seven age groups, 18–24, 25–34, 35–44, 45–54, 55–64, 65–74, and 75–84.

3.2 Literature review

The literature review focused on the relationship between accident risks and the use of mobile phones while driving. The Library and Information Centre of VTI conducted the literature review. The review was limited to surveys of actual traffic environments and did not include surveys conducted in artificial or laboratory environments. Another criterion was that the surveys should be from after 1995. This search resulted in a total of 25 surveys. After perusal, around 10 surveys remained which were of interest and worth presenting in the study.

3.3 Focus group discussions

Focus group discussions is a qualitative method to gather information and raise research questions which are important to examine in a quantitative study (Wibeck, 1998). During fall 2002, VTI undertook two focus group discussions of mobile phone users to gather information about the usage of mobile phones in a general as well as a driver perspective. The purpose of the focus group discussions was to analyse the driver's actions, habits, routines, and experience when using mobile phones and how opinions and attitudes related to mobile phones are expressed in a group.

Each discussion group comprised an equal number of men and women. All were licensed drivers and owned a mobile phone. The participants had varying backgrounds and work experience. One group, called the older group, comprised eight people between 45 and 60. The other group, called the younger group, had six participants, aged between 19 and 26.

The discussions in each focus group were between the participants, but were moderated and assisted by VTI personnel in order to initiate the discussion, keep notes, and record the conversations. The discussion group was allowed free conversation, but the moderator had a prepared interview guide with a list of questions, which were to be addressed in the discussion. The interview guide was used only if a question was not raised spontaneously or if the discussion broke down. After each discussion, the notes of the discussions were structured and analysed along with the text from the recording as to content and topical focus in each discussion. The analysis emphasised the content of the discussions, i.e. the view, attitudes, thoughts, ideas and experiences presented. Each discussion was analysed separately and thoughts were then compared with results from the other discussion and sorted by category. The purpose of analysing the discussions was not to compare results, but to establish as rich a background as possible for designing questions in a questionnaire.

It is important to remember that opinions presented in the discussion groups, cannot be generalized. The experiences and opinions, which were compared, were only related to these two groups and their participants. In order to determine if the differences expressed in the discussion groups could be applied to other groups of people, it is important to continue research on the generated hypotheses. This is done via a questionnaire, which was partially constructed from the results of the focus group discussions.

3.4 Questionnaire survey

The questionnaire was given to drivers with the purpose of identifying behaviour and habits of drivers using mobile phones while driving. Information from the focus groups was used to design the questions in the questionnaire.

The initial intention was to send the questionnaire to a selected group of licensed drivers. Due to legal restrictions, however, the driver's registry could not be used. Therefore, it was necessary to make a larger sample from the Swedish National Tax Board's billing register, which covers all registered inhabitants of Sweden. The sample comprised 5,129 people, randomly chosen within the ages of 18 and 74. The questionnaire was distributed in the beginning of 2003. After a reminder, 3,090 people had responded to the questionnaire. Of the respondents, 52 per cent were women, and 48 per cent were men. The number of completed questionnaires, which is the basis for the results, was 3,002. The response ratio was 63 %, when adjusted for people not available.

The answers for many of the questions were grouped by age, 18–24, 25–34, 35–44, 45–54, 55–64, and 65–74, and by sex. The number of people from each of these 12 groups varied between 195 and 310. There were 2,128 active drivers who reported that they always or almost always carried a mobile phone. They are the focus of this report.

The issues examined, were if the driver stopped, reduced speed or took other safety precautions when using the mobile phone. Another interesting question was how common it was to have the mobile phone activated when driving, plus the

driver's risk perceptions and incidents the driver may have experienced while having a mobile phone conversation.

4 Results

This chapter gives an in-depth synopsis of the most important results in this study.

4.1 Access to mobile phones and equipment

TSU92-

According to the Traffic Safety Survey, TSU92-, the percentage of drivers aged between 18 and 84 who have access to mobile phones while driving has increased from 55 % to 73 % between 1998 and 2001. Almost all young drivers (90 %) aged between 18 and 24, had a mobile phone while driving and this result is valid for both young men and women. If young people are excluded, men were more likely than women to have a mobile phone in the car. Older drivers were less likely to have access to a mobile phone than were younger drivers. Of all drivers aged 75 to 84, only 30 % had access to a mobile phone in their daily travels in year 2001.

According to TSU92-, 85 % of all mileage during 2001 was by drivers who had access to mobile phones while driving, as compared to 73 % in 1998. The access to and use of mobile phones while driving was strongly correlated with the distance travelled.

In 2001, 17 % of all drivers who had access to a mobile phone while driving had access to hands-free equipment. More men than women had access to hands-free equipment.

Focus groups

Several of the participants in both focus groups had experience of hands-free equipment. Those who had tested or heard others describe permanently mounted equipment preferred that. Headsets also functioned well, but the cable often got wound-up around the mobile phone or got tangled up with the seat belt.

The older group suggested voice activated dialling as an alternative to the phones keyboard. However, if the phone was used for work, the voice-activated system could often not be used since many times there was a new number to be dialled.

The younger group usually put the mobile phone by the parking brake or on the passenger's seat. Older participants were more likely to have a mobile phone holder on the dashboard next to the steering wheel. Some kept the mobile phone in their pocket, which resulted in some difficulties when it rang.

Questionnaire

One of the questionnaire's first questions was concerning the respondent's general use of mobile phones. Just over half of all respondents used a mobile phone daily. In the youngest age group, 18 to 24 years old, 75 % used mobile phones daily. The daily usage in the oldest age group, 65 to 74 years old, was 20 %. A difference between genders was evident – women used mobile phones somewhat less than men did, in all age groups except the youngest.

Of the drivers who drove privately, 71 % always or almost always carried a mobile phone. Younger drivers more often than older carried mobile phones, but there was no difference between men and women. 85 % of the drivers who were driving because of work had a mobile phone with them.

A result from the questionnaire is that almost 75 % of the drivers' mobile phones were hand-held and the rest were hands-free. Of the hands-free mobile phones, the majority were of the headset type, ear speaker with cable microphone,

but a small percentage were permanent car mounted speaker and microphone systems. Hands-free equipment was more often found in company owned or leased cars, than in privately owned cars, 32 % versus 22 % Young and older drivers (18–24 and 65–74 years old) were most likely to be using a hand-held mobile phone.

Voice activated dialling was used for more than half of the conversations of the six % of drivers who used it while driving. Voice activated systems were used more often by men than women, and more often among drivers under 45.

While driving, 30 % of all men kept their mobile phone in their pockets, compared to only 13 % of all women. Of all men, 45 % placed their mobile phone in a holder on the instrument panel versus just over 30 % of all women. The most likely alternative for women, 25 %, was to have the mobile phone on the passenger’s seat. Another common response was “Other”, which most often meant having a mobile phone in a purse or handbag.

4.2 Usage while driving

TSU92-

According to TSU92-, approximately 30 % of the drivers who brought a mobile phone used it during daily travels. This percentage has been fairly stable during the last five to six years.

Approximately 35 % of all younger drivers used mobile phones while driving versus about 10 % of the older drivers. About 35 % of all male drivers with access to a mobile phone used it while driving versus 20 % of all female drivers, see figure 1.

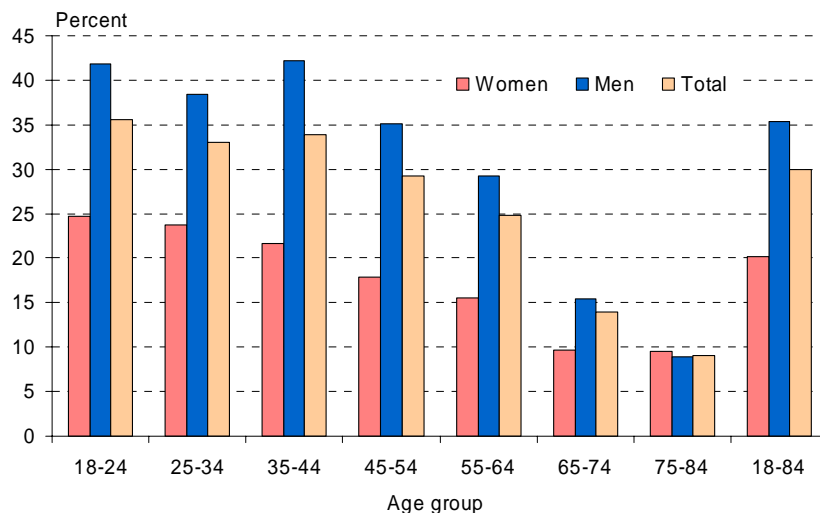


Figure 1 Percent of drivers who had access to mobile phones and used them while driving, grouped by age and sex, (Thulin, 2003a).

The average length of conversations per day while driving was approximately 10 minutes, or 7 minutes if only conversations in privately owned vehicles are considered. Drivers with access to hands-free equipment used their mobile phones

more than those with hand-held phones. Those with hands-free also had 20 % longer conversations per day than drivers with hand-held mobile phones.

Focus groups

The discussions in the focus groups revealed differences in the use of mobile phones while driving, which was based on the general experience one had with mobile phones. The major difference was that the younger group wasn't hesitant to use mobile phones at any driving conditions, except possibly when driving in the dark. In the older group the difference was more related to use of the mobile phone for work or not. For those with a job requiring extensive travelling, the mobile phone was often a condition for proper work and these users had a more experience of mobile phones. The younger group also showed a gender difference. Men seemed less restricted in their use of mobile phones, possibly because they considered themselves as more self-confident in traffic than women.

The greatest difference between the age groups was more frequent use of text messages, SMS, in the younger group. The older group had very little knowledge of this. The majority of the younger group read and wrote SMS messages while driving, but not in heavy traffic, queues, and not while driving in the dark.

Participants who had used some form of hands-free equipment felt that it was a necessity to simplify driving. Some participants, from both groups, equated a hands-free conversation with talking to a passenger. Others felt that a mobile phone conversation was more engaging than talking with a passenger and thus reduced concentration on driving. Even a conversation with a passenger could distract the driver's concentration, but driving experience enabled it anyhow. A point made by the older focus group, was that hands-free equipment tended to lengthen the conversation, since the lack of effort to hold the phone didn't hasten the end of the conversation.

Questionnaire

Of the drivers who drove private cars and had mobile phones with them, 70 % always or almost always had it activated while driving. Young people were the most likely to have their mobile phones activated, and older drivers the least likely, see figure 2. Women had their mobile phones activated less often than men, 65 % versus 75 %. Company drivers were more likely to have their mobile phones activated, 80 %, than private drivers.

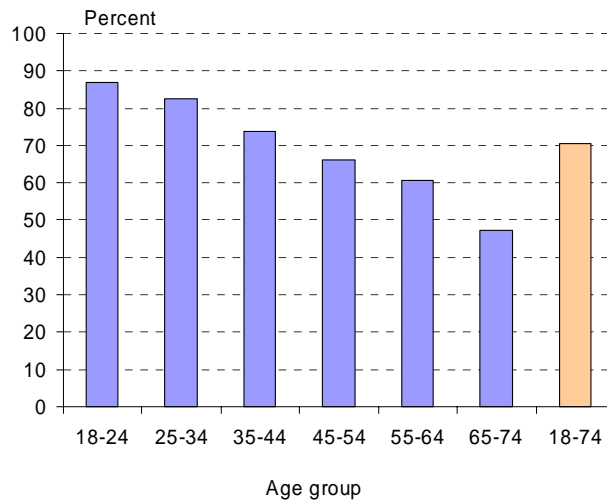


Figure 2 *Per cent of private car drivers who said that they always or almost always have their mobile phone activated while driving, (Thulin, 2003b).*

On average, drivers made or received 7.4 mobile phone calls per week while driving, or approximately one per day. Men made and received more calls than women and middle-aged drivers more so than any other age group, see figure 3. All drivers received more calls than they made themselves. The number of calls, made or received, was strongly correlated with the driver's yearly mileage. The number of calls increased with mileage.

About 25 % of all mobile phone conversations were work related. Men accounted for 75 % of all these work related conversations. In the age groups between 35 and 64, the percentage of work related calls was 30 % of all conversations – highest for men with 40 % of the conversations being work related.

A call made by the driver was on average 1.5 minutes, while a received call took, on average, just over two minutes. The middle-aged group had longest conversations, with men having mobile phone conversations approximately 50 % longer than women.

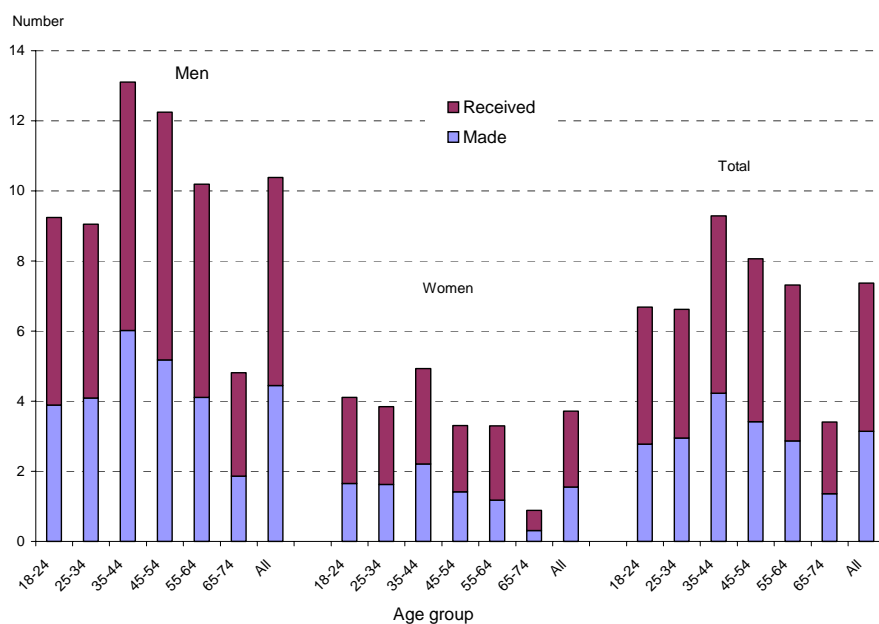


Figure 3 The number of mobile phone calls per week that the driver made or received while driving, (Thulin, 2003b).

Writing or reading text messages, SMS, was something that almost only young people did while driving, see figure 4. On average, one text message, SMS, was received or sent per week. The youngest group averaged three SMS per week, and mostly by the men. The majority of SMS were received, but a third of the younger group's messages were written while driving.

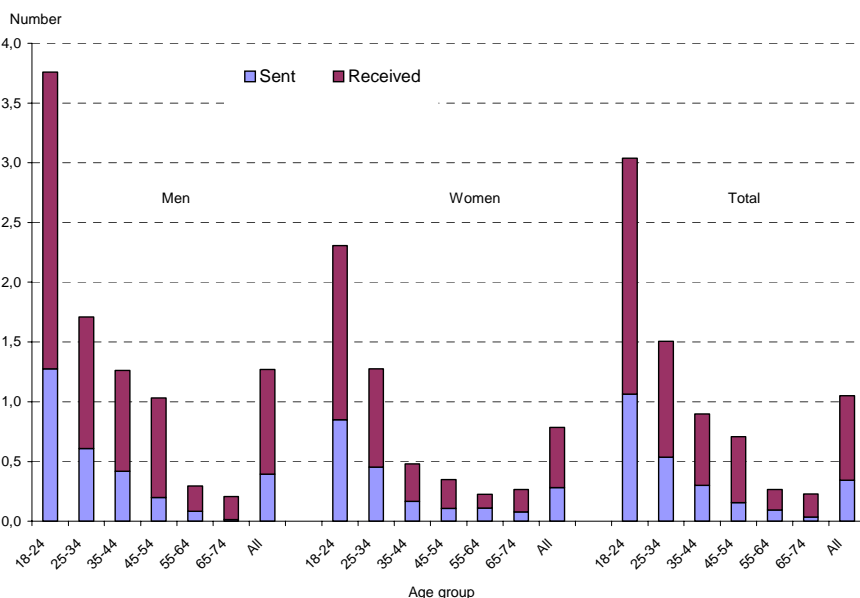


Figure 4 The number of SMS per week that drivers sent or received, (read), while driving, (Thulin, 2003b).

Comparisons and comments

The total number of calls while driving – an average of 1.1 per day – can be seen as a relatively small value. However, the purpose was to estimate the number of calls while the driver was actually steering, i.e. not including the safety precaution often used, i.e. when the drivers stop and pull over etc.

The Norwegian survey, (Sagberg, 1998), also showed the number of calls made and received to be higher than recorded via the questionnaire. According to the Norwegian survey, drivers made or received 2.5 mobile phone calls per day while driving. However, this survey dealt with drivers who had been involved in accidents reported to insurance companies. A larger number of calls can be expected in such cases, since both involvement in accidents and usage of mobile phones are correlated with mileage.

4.2.1 When and where mobile phones are used

Focus groups

The majority of the participants in the focus groups felt it was easier to use their mobile phones on highways compared to secondary roads. City driving was much more complex, especially without hands-free equipment, because of the need to use turn signals, shift gears, and turn while holding the mobile phone.

Questionnaire

The respondents were asked to indicate – on a scale from one to three – where they most often used their mobile phone. The choices were "in cities", "on secondary roads", and "on highways". Nearly 35 % of the respondents used their mobile phone most frequently in city traffic. This result is consistent with the amount of total mileage driven in urban versus rural areas. Men used their mobile phones more often than women while driving in urban environments. The answers by women varied more between different age groups, and women over 44 were less likely to use their mobile phones in cities.

Just over 25 % of all drivers' conversations in mobile phones occurred on weekends. Comparing the number of miles driven each weekend one can possibly say that relatively speaking, more conversations occur on weekends than on weekdays (Nilsson, 1996). There are differences between the age groups. The greatest number of mobile phone conversations on weekends was by drivers aged 18 to 24, 40 %, and the lowest number was by drivers aged 65 to 74, 15 %.

4.3 Behaviour during conversation

This chapter is about drivers' behaviour during conversation i.e. which influence talking has on driving, if there are any incidents and which actions and safety precautions the driver takes.

4.3.1 Influence on driving

Focus groups

Everyone in the focus groups agreed that one became a poorer driver when simultaneously talking in a mobile phone and driving. There was less concentration on driving and the ride became unsteady. There was also a problem to hold the mobile phone, if not using hands-free equipment, while steering, signalling, and turning.

Use of mobile phones resulted in getting lost, missing exits, and missing change of lights at intersections. Some participants felt that they ought to reduce their mobile phone conversations while driving, but no one had actually done so.

Questionnaire

Of all drivers, 48 % said that they had been so concentrated on their mobile conversation that occasionally they had missed an exit or traffic signal, swerved into the wrong or opposing lane, lost control of the car so it started to slide, or kept too high or too low speed relative to traffic conditions. The ratio was 62 % for the youngest age group and 24 % for the oldest group, and the ratio was higher for men than women, see table 1. "Keeping too low a speed in relation to traffic conditions" was the most usual response, followed by "Missed an exit or on-ramp", and thereafter by "Keeping too high speed in relation to traffic conditions", and "Failed to observe traffic signal, stop, or warning sign". The other three choices, "Changed over into opposing traffic lane", "Changed into wrong lane", and "Caused the car to slide" were less frequent responses.

Table 1 Percent of drivers who said that they had on at least one occasion been so concentrated on a mobile phone conversation that they had missed an exit, traffic signal, changed into the on-coming traffic lane or wrong lane, caused the car to slide, or had too high or low speed in relation to the traffic conditions, (Thulin, 2003b).

Age	18–24	25–34	35–44	45–54	55–64	65–74	Total
Men	66	67	58	54	44	30	54
Women	58	58	45	35	29	13	42
Total	62	63	52	45	37	24	48

4.3.2 Incidents

Focus groups

None of the participants in either focus group had been involved in any accident or near accident where the use of a mobile phone while driving could have been a contributing factor. Those in the older group thought that the use of mobile phones while driving caused near accidents, but not actual accidents. One person in the younger group had relatives who were in an accident caused by use of a mobile phone. The participants were careful to stress that there are other distractions in a car that could cause accidents, such as changing a CD disk or children that are arguing.

In the younger group, it became apparent that not everyone had considered the fact that they themselves could cause an accident. However, they considered that a bus driver who used his mobile phone while driving had a much greater responsibility. There were more people on the bus, and a bus was considered more difficult to control than a car.

Questionnaire

The respondents were asked if they had on several occasions, some time, or never been so concentrated during a mobile phone conversation that an incident occurred. 18 % responded that on at least one occasion they have been close to colliding with another driver, an object or close to driving off the road. The percentage was 35 % for the young people, aged 18 to 24, and 4 % for the oldest

group, 65 to 74, see table 2. The number of incidents was higher for men than women in every age group. The most usual answer was “Close to driving off the road”, followed by “Close to colliding with an on-coming car”, and “Close to colliding with a solid object, fence post, etc”. About 10 % said that they had been close to driving off the road. Incidents that related to hitting vulnerable road-users were relatively few.

Table 2 Per cent of drivers who said that they at least on one occasion had been so concentrated on a mobile phone conversation that they had been close to collide with something or driving off the road, (Thulin, 2003b).

Age	18–24	25–34	35–44	45–54	55–64	65–74	Total
Men	40	28	22	20	12	6	21
Women	30	20	15	9	6	1	14
Total	35	24	19	15	9	4	18

4.3.3 Safety precautions

Focus groups

The older participants said they generally reduced speed while driving and using a mobile phone. Often this was done subconsciously, at least when driving on a highway. The younger group did not mention anything about reducing speed other than related to observance of the law and when one spotted the Police.

Both focus groups discussed the behaviour when making a call. Some older participants always stopped driving, while others stopped only if they needed to write something down or reception was poor. Some older participants planned their calls to avoid calls in city traffic and waited until they were out of the city or on a highway. Sometimes calls were planned by dialling the number at a red light, and the actual call was not made until later when a better opportunity presented itself.

The younger participants usually did not stop when they received a call. Some felt this was a sign of becoming an “old man”. Occasionally it happened to younger group participants that they would have liked to stop when called, but this was seen as being a problem. They had greater need to stop while driving in a city, but it was much more difficult to find space to stop quickly. Some stopped at bus stops, and another tried to find parking spaces. However, the younger people tried to keep their conversations as short as possible while driving in a city.

Questionnaire

Typically, drivers took some form of precaution when using mobile phones while driving. 25 % of the questioned drivers responded that they did not make calls while driving, and approximately 10 % said that they never answered a call while driving, see figure 5 and figure 6. Women were more likely to avoid making calls than men, and older drivers were more likely than younger drivers. It was also shown, that young people, aged between 18 and 24, were more likely to avoid making calls while driving than the next two age groups, 25–34 and 35–44.

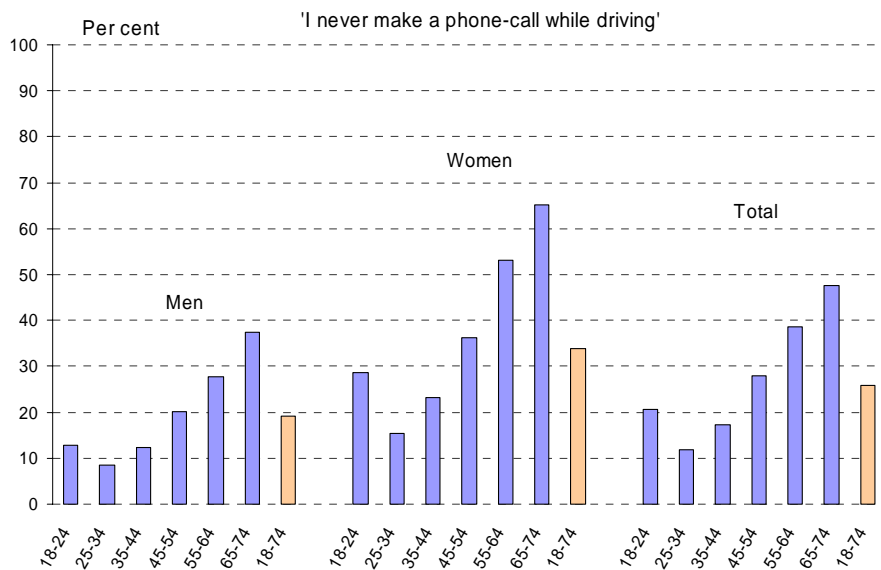


Figure 5 Percent of drivers who responded that they avoided calling in their mobile phones while driving, (Thulin, 2003b).

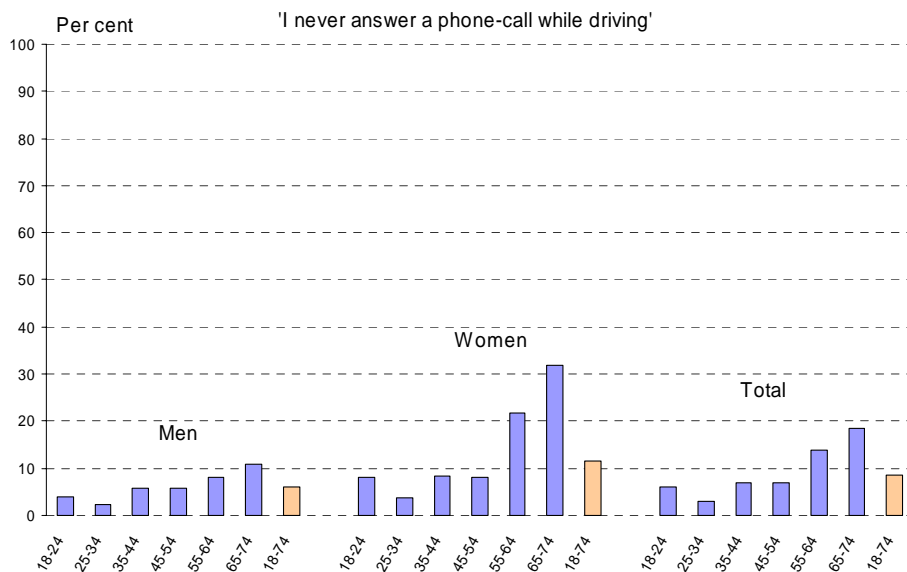


Figure 6 Percent drivers who responded that they avoided answering their mobile phones while driving, (Thulin, 2003b).

Two of the questions in the questionnaire dealt with driver behaviour during mobile phone conversations whilst driving. 70 % of the drivers said that they always/almost always avoided overtaking when they made or received a call.

Each of the following actions was to be answered on a scale of four levels – from always/almost always via often and seldom to almost never/never.

The drivers who made calls while driving said that they always/almost always or often took some safety precautions. For example:

- 30 % stopped their car
- 55 % slowed down
- 65 % chose a time when there was little traffic
- 55 % chose a time when the traffic was still or moved slowly (such as in a queue or at a red light)

The drivers who answered a mobile phone call while driving said that they always/almost always or often took some safety precautions. For example:

- 70 % minimised the conversations
- 60 % slowed down
- 40 % asked a passenger to answer
- 30 % asked if they could call back or asked the other person to call back later
- 25 % pulled over and stopped the car when they got a call.

Of all drivers, 25 % said they did not use their mobile phones while driving in darkness. 33 % of all women and not quite 20 % of all men avoided answering in the dark. Older drivers refrained from answering much more often than younger drivers, see figure 7. Nearly 35 % of the drivers, who still used their mobile phone while driving in darkness, restricted its use.

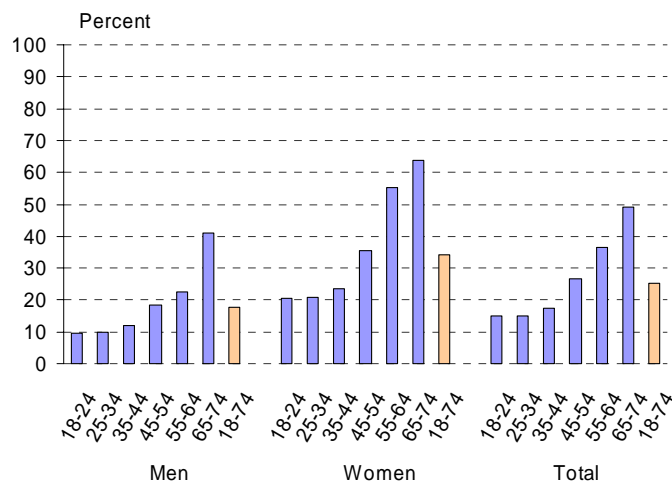


Figure 7 Percent of drivers who avoided using their mobile phones while driving in darkness, (Thulin, 2003b).

Comparisons and comments

The literature review showed that drivers in general used some type of safety precaution when driving and using mobile phones. Claire Laberge-Nadeau et al. (2001) reported that:

- 25 % of all drivers stopped their car when they were going to make a call with their mobile phone,
- 50 % reduced speed,
- almost 50 % of all drivers waited for a red light before calling.

80 % of the drivers took at least one of the described measures of precaution before using their mobile phone, women more often than men.

These results are quite similar to the results from the questionnaire in this report.

4.4 Accidents and injuries

Questionnaire

During the period 2001 to 2002, 231 respondents of the 2,128 active drivers (11 %) had been involved in one or more accidents while driving. If this percentage is compared with the number of license holders, approximately 5 million, which also are active drivers, it means roughly 300,000 accidents per year. This also means that 250,000 of these accidents would be reported to the drivers insurance companies, see table 3. This number is fairly consistent with the number of yearly reported traffic accident claims for cars according to the Swedish Insurance Federation.

Table 3 *Percent of driver's reported accidents leading to personal injuries, insurance claims, or police reports, (Thulin, 2003b).*

	Personal Injury	Insurance claim	Police Report
Number = 231	%	%	%
Yes	16	81	29
No	63	13	50
Unknown	21	6	21
Total	100	100	100

Of these 231 “accident drivers”, 13 stated that the accident had occurred while they were in a mobile phone conversation, see table 4. If this percentage is compared with the national number of drivers, it would mean 17,000 accidents per year in which drivers were in the middle of mobile phone conversations. This would mean about 11,000 insurance claims per year, 3,000–6,000 accidents with personal injuries, and about the same amount of police reported accidents. Of the accidents reported by the police, 15 % would be personal injury accidents. Of these personal injuries, 3 % would result in deaths, which would mean about 14–28 fatalities per year where drivers were in mobile phone conversations.

Table 4 The number of accidents where the driver was having a mobile phone conversation, (Thulin, 2003b).

	Personal injury	Insurance claim	Police report
Yes	2	8	2
No	8	3	6
Unknown	3	2	5
Total	13	13	13

As table 5 shows, two “accident drivers” responded that the mobile phone had been a contributing factor, and seven responded that it might have been a contributing factor to the accident. This means that the use of a mobile phone could have been a contributing factor in about 70 % of the accidents, which occurred while the driver was in a mobile phone conversation. If re-calculated according to the number of insurance claims per year, this would mean 8,000 claims per year. If re-calculated according to the number of police reported accidents, then 9–18 fatality accidents in road traffic would be caused each year by drivers engaged in mobile phone calls. In these 9–18 accidents, approximately 10–20 deaths could be expected.

Table 5 The number of drivers having mobile phone conversations who were involved in traffic accidents in which the driver felt that the mobile phone contributed to the fact that the accident occurred, (Thulin, 2003b).

	Number
Yes	2
No	2
May be	7
Don't know	1
Unknown	1
Total	13

Comments and comparisons with literature review

If one correlates the results of tables 1 and 2 with the time each age group uses mobile phones for calls while driving, the relative risk for irregular/improper behaviour or incidents can be roughly estimated. Indirectly, it is possible to make a rough estimate of the relative risk for accidents for each age group.

Table 6 compares the risk for each age group with the age group 35–44, which has been given a value of 1. The risk for “improper behaviour” is highest for the oldest and for the youngest groups. The risk for incidents is three times higher for the youngest group than for the 25–34 group, and the risk for the oldest group is also somewhat higher. These risk profiles correspond fairly well with the risk profiles of drivers in police reported accidents as a whole, i.e. not considering the use of mobile phones. The results seem to show that the relative accident risk related to the usage of mobile phones while driving affects the different age groups equally.

Table 6 Relative risk for "improper behaviour" or incidents when the driver uses a mobile phone while driving. Computed data (Thulin, 2003b).

Age	"Improper Behaviour"	Incidents
18–24	1.9	3.1
25–34	1.7	1.9
35–44	1.0	1.0
45–54	1.1	1.0
55–64	1.3	0.9
65–74	2.4	1.2

In the literary review, the Norwegian survey, (Sagberg, 1998), which showed how often drivers involved in accidents reported to insurance companies, pointed out the use of mobile phones while driving contra other distractions or "split concentration" activities as the reason for the accident. Of 14 such reasons, the use of mobile phones came next to last. Conversations with passengers was the reason for the largest number of accidents, 7.8 %, followed by tiredness, 3.9 %, children in the backseat, 2.6 % and searching after street names and house numbers, 2.3 %. Putting in or taking out CD's from the CD player was the reason for 1.1 % of the accidents, and adjusting the radio station or similar activities resulted in 1.0 % of the accidents. Smoking resulted in 0.6 %, and eating or drinking resulted in 0.4 % of all accidents. The use of mobile phones shared 13th place together with "insects in the car", and resulted in 0.3 %. The least frequent reason was reading a map while driving, 0.2 % of all accidents. The sum of all accidents caused by distraction was 23.9 %. The survey was restricted to accidents reported to insurance companies, and where the accident type was a crash, driving off the road, rear-ending, overtaking, hit against a solid object and being hit while parked on the side of the road.

The most widely used reference on accident risks and use of mobile phones is the survey done by Redelmeier and Tibshirani (1997). The results showed that the risk to be involved in an accident as a driver increased four times when using a mobile phone while driving, and that the heightened risk remained several minutes after the driver completed the conversation. The result did not show lower risks for drivers using hands-free equipment versus hand-held. The research did not include accidents with grave or deadly personal injuries.

However, a survey by Claire Laberge-Nadeau et al. (2001) disputed the results of the Redelmeier and Tibshirani survey. The dispute concerned the method of the report and incongruity, which in their opinion lead to a significant inflation of risks. The report by Claire Laberge-Nadeau et al. (2001) measured the heightened risk factor to 38 %. This included the risk for accidents with personal injuries as well as risk for those with property damage only. The results were based on a questionnaire to 175,000 licensed drivers.

The questions were on exposure, driving habits, understanding of activities which could affect the driver's safety when driving, and accidents that had occurred within the last two year period. The response ratio was a rather low 22 %. In the report, it was also shown that much of the heightened risk was due to the distance travelled, in this case the amount of miles travelled each year, and the amount of time the driver had used his mobile phone, which is also highly

correlated to the amount of miles travelled. Both men and women who used mobile phones while driving, travelled more miles than drivers who did not use mobile phones, and the drivers who used mobile phones drove more often during late evening and night hours than the non-users. The results also pointed to the fact that mobile phone users more often than non-users, listen to the radio, cassette tapes, or CD's when they drive. Mobile phone users tended to adjust the sound system more often, changed the radio station, changed cassettes etc., more often than non-users, i.e. in general they spent more time with activities distracting from driving and increased the chance for accidents. This applied to both men and women.

The Norwegian survey (Sagberg, 1998) determined an accident risk increase of 62 % for a driver using a mobile phone while driving. This increase is somewhat lower than the estimated risk increase in this study. However, both results are crude estimates. The Norwegian study also showed that drivers who were using mobile phones were over-represented in the statistics for accidents as a result of lane changes, rear-ending, and accidents where the driver ran into some object.

The Finnish study (Holopainen, 2000) made an analysis of accident fatalities in Finland, based on the Finnish Road Accident Investigation Team's material on accidents in which mobile phones were a contributing factor to the accident. The material covers 26 traffic accident deaths from 1991–1998. One relationship that could be established was that the number of deaths did not follow the same dramatic or accelerating development as the number of mobile phones. Near the end of the period, on average four accidental deaths occurred per year where the use of mobile phones was seen as a contributing cause to the accident. This result agrees with the relationship in Sweden, based on the calculation made in this report of the number of deaths when adjusted per capita.

Another conclusion in the Finnish survey was that the number of accidents related to mobile phone use by drivers (approximately 1.5 %) was not particularly high. This figure is comparable to the statistics for the number of accidental deaths, where conversation with passenger was seen as the contributing cause, 3 %, driver's tiredness, 14 %, and intoxication, 27 %. Half of the accidents with drivers engaged in mobile phone procedures occurred during conversation and the rest while the driver was reaching for the phone, putting it aside or dialling a number, etc. Accidents were often caused by a "combination" of several risk factors. The most common risk factors, in addition to using a mobile phone, was too high speed in relation to the traffic conditions, non-use of seat belt, the driver's attitude and willingness to take risks, intoxication, tiredness from long distance driving, and icy roads. The survey seems to distinguish between two groups of mobile phone users: "normal" users and those with a higher acceptance of risk. Those in the higher risk group satisfied the majority of risk factors above. A similar risk group might possibly be identified among the mobile phone users in the questionnaire survey and in TSU92-.

4.4.1 Subjectively determined risks for accidents

Questionnaire

In the questionnaire, participants were asked about their attitudes towards using mobile phones while driving, and their attitude to not using mobile phones while driving. Everyone, regardless of whether they seldom or never used a mobile phone, answered these questions. Close to 90 % of the respondents stated that the

use of hand-held mobile phones increased the accident risk, and 52 % felt the increase was significant, see table 7. Of the respondents, 63 % said that hands-free mobile phones increased the risk of an accident, and 9 % thought the risk increased significantly.

Table 7 Drivers' views of accident risk when using hand-held versus hands-free mobile phones while driving, (Thulin, 2003b).

	Hand-held		Hands-free	
	Number	%	Number	%
Use give significantly increased risk	1,572	52	256	9
Use give somewhat increased risk	1,100	37	1,608	54
Use does not give increased risk	74	2	652	22
Don't know	185	6	402	13
Unknown	71	2	84	3
Total	3,002	100	3,002	100

A comparison of the responses for hands-free versus hand-held showed that more respondents were of the opinion that hands-free mobile phones did not increase the accident risk, 22 %, versus 2 % for hand-held. Several respondents were uncertain and answered "don't know" to the issue if hands-free equipment increases the accident risk, 13 %, versus 6 % response for hand-held.

Women, more than men, stated that the use of mobile phones while driving increased the risk of an accident. Similarly, older respondents, more than younger, were of the opinion that mobile phone use increased or significantly increased the risk of an accident.

The use of hands-free equipment was seen as significantly less risky than hand-held mobile phones both by drivers who used hands-free equipment and by those who did not. In comparison with users of hand-held phones, the drivers using hands-free equipment more often stated that the use of hand-held mobile phone lead to somewhat or significantly increased accident risks.

The respondents who seldom or never used a mobile phone while driving stated to a significantly higher degree that the use of mobile phones while driving increased the risk of an accident, than did those who frequently used a mobile phone.

4.5 Advantage of mobile phones

Focus groups

Everyone in the two focus groups felt that the most important advantage with mobile phones was to be able to call for help in case of an accident, but it was also important to be able to call for assistance if the car broke down. Several participants had used their mobile phones to contact the police or other assistance.

The older participants felt an assurance if their children had a mobile phone, so they could quickly contact them and vice versa. Even the elderly were given mobile phones, as assurances in case something would happen when outside home. However, it was not that easy to teach the elderly how to use a mobile phone. Even the younger group discussed the elderly's use of mobile phones. They considered it as a security measure, but hoped that the elderly wouldn't use their mobile phones while driving, since it was more than enough with just driving.

The younger group focused much of their discussion on always being available and sticking to the principle of never turning off their mobile phone. Mobile phones create a need. It is the most important means to keep in touch with friends. They sensed a joy in owning their mobile phone, and felt curious and excited when the phone sounded or when they received a message.

Questionnaire

The most important advantage with a mobile phone in the car was the personal security and assurance of being able to be contacted and to contact others, see table 8. Women emphasised this somewhat more than men. More men than women felt that an important advantage of mobile phones was the opportunity to work while driving. Another advantage that many gave as one of the three choices was being able to call for emergency help when needed.

Table 8 Respondents' answers to which the three most important advantages are of having a mobile phone in the car, (Thulin, 2003b).

	Men %	Women %	Total %
Can be contacted, which is a security to those closest to me	28	31	29
Can contact others, which is an assurance to me	24	30	26
Can call and talk to my friends	4	1	3
Can call SOS-alarm, if needed	26	30	28
Can do work	13	4	9
Can use the time in the car to carry out personal tasks	3	2	2
Can talk with someone to keep me awake	1	0	1
Other	1	1	1
Total	100	100	100

One of the dominant advantages of a mobile phone in the car was being able to alarm the police or ambulance in case of an accident and drivers seem to make use of this advantage quite often. 16 % of the active drivers (335 respondents) responded that they had witnessed an accident during the years 2001 and 2002, see table 9. Of these witnesses, 75 % (252 respondents) were travelling in a car; and of those, 36 % (90 people) used their mobile phone to call the police or emergency service.

Extrapolating these percentages to the total number of licensed drivers in Sweden between the ages of 18 and 74, approximately 5.2 million, gives a result of 800,000 drivers who have witnessed accidents in a two year period, or 400,000 witnesses on a yearly basis. Of these drivers, 300,000 passed the accident scene while driving, and 100,000 of these drivers called the police or an ambulance using their mobile phone.

Table 9 The number of licensed drivers who had witnessed traffic accidents, had been driving while being a witness, and had used their mobile phone to contact the police or an ambulance. The results are for years 2001 and 2002 (Thulin, 2003b).

	Witnesses to accidents		Witnesses who were driving		Witnesses who were driving and used a mobile phone to call for assistance	
	Number	%	Number	%	Number	%
Yes	335	16	252	75	90	36
No	1,657	78	71	21	156	62
Unknown	136	6	12	4	6	2
Total	2,128	100	335	100	252	100

4.6 The future and prohibition

Focus groups

The older focus group felt that a law requiring use of hands-free equipment while driving, similar to such laws in other countries, would not be regarded anything negative. The younger group knew that in some other countries only hands-free equipment is allowed while driving, and also knew that no such laws have been passed in Sweden.

The older participants were concerned by young persons' use of mobile phones while driving. They knew that young persons always have their mobile phone activated, and that their mobile phones have many functions, which are used regularly, especially SMS. The older group was concerned about the future, with young people driving cars and continuing to use all the functions of their mobile phones.

When the young group discussed the future, they emphasised development of mobile phones and all the possible new functions rather than driving aspects. They could see that the development of mobile phones and their use had increased dramatically, and was spread to very young users. They also pointed out that the manufacturers had not taken any responsibility for traffic safety, since they added more and more functions and created a need for these services. Both groups discussed the idea that the number of functions could depend upon the relative novelty of mobile phones and that eventually the trend might revert to a simple device only used for phone calls.

Questionnaire

31 % of the 3,002 respondents in the questionnaire felt that all use of mobile phones while driving should be prohibited, regardless of the type of equipment used, see table 10. However, as the table shows, a rather large group, 25 %, had no opinion or had left the question unanswered. Almost half, 48 %, of the respondents felt that hand-held mobile phones should be forbidden. However, also for this question there was a large group without any opinion. Women and older persons were more in favour of prohibition than men and younger people.

Respondents who seldom or not at all used a mobile phone while driving were also more in favour of prohibition than those who use them frequently. Users of hands-free equipment were also more in favour of a law against use of hand-held mobile phones in cars.

Of the 2,128 active drivers who used mobile phones, 25 % responded that all use of mobile phones in cars should be forbidden. However, only 10 % of the drivers who used hands-free equipment were of this opinion.

Table 10 *Percent respondents who favoured a law against use of mobile phones while driving, (Thulin, 2003b).*

	Prohibit all types of mobile phones			Prohibit all types of mobile phones except hands-free		
	Men	Women	Total	Men	Women	Total
	Nbr=1,450	Nbr =1,552	Nbr =3,002	Nbr =1,450	Nbr =1,552	Nbr =3,002
Yes	25	37	31	44	52	48
No	53	36	44	31	17	24
Don't know	11	12	12	13	14	14
Unknown	10	15	13	12	18	15
Total %	100	100	100	100	100	100

4.7 Attitudes related to traffic safety

TSU92-

TSU92- includes questions about drivers' use of seat belts and if their vehicle has airbags. When this data was correlated to drivers' access to mobile phones, it could be concluded that drivers with mobile phones used seat belts somewhat more than those without. Drivers with mobile phones were also more likely to have a vehicle with airbags. Drivers with longer mobile phone conversations on a daily basis, which is strongly correlated to longer distances travelled per day, appeared to be more likely to have airbags in their cars, but there was no difference or a slightly negative trend in use of seat belts. This possible negative trend became pronounced when the lengths of conversations by drivers in the youngest group, 18 to 24, was compared with their use of seat belts. The use of seat belts decreased from 92 % for those who never or seldom used a mobile phone while driving, to 77 % for those who used their mobile phone more than 15 minutes per day.

Questionnaire

The questionnaire included four questions from the Swedish National Road Administration's yearly Traffic Safety Survey, (SNRA, 2003). These questions were related to if traffic had become more risky during the last year, attitudes to driving speed, use of seat belts and use of alcohol in combination with driving. These responses were correlated with the driver's use of mobile phones while driving.

The definition of a driver who seldom or never uses a mobile phone while driving includes those who seldom or never use mobile phones in their daily life and drivers who make less than two calls a week while they are driving. The definition of a driver who frequently or very frequently uses their mobile phone is a person who makes two or more calls per week while driving.

The drivers calling frequently used seat belts less than the drivers who seldom or never made a mobile phone call. These frequent users were also more likely to have used alcohol, stronger than 2.25 %, while driving, had greater leniency for exceeding the speed limit, and judged the risks in traffic as being lower.

5 Discussion

This report has presented results on the use of mobile phones while driving. Different methods have been used to develop a wide spectrum of results. However, this also means that the results are difficult to compare since the methods vary in the different studies. This chapter will compare and discuss the different results from the studies. The term “questionnaire” is meant to identify the questionnaire used in this study, and not the Traffic Safety Survey TSU92-.

TSU92- is a continuous traffic safety survey, which is sent out daily, 365 days a year, to randomly chosen people. The information gathered is all travel and movement during 24 hours. The information collected is often the distance travelled by some transportation mode. TSU92- also measures the length of time, measured in minutes, that the participants have used their mobile phones per day.

TSU92- gives a better result than this report's questionnaire. The questionnaire can only roughly through a fixed choice of alternatives and classes attempt to determine use and behaviour related to mobile phones. The questionnaire focuses on the driver's use of mobile phones while driving. TSU92- examines the use of mobile phones and how drivers use them in conjunction with driving; which is not necessarily limited to situations where the driver is actually driving.

However, results from TSU92- and the questionnaire seem to be compatible. TSU92- shows that 73 % of all drivers in 2001 had access to mobile phones and that approximately 30 % of all drivers used their mobile phone while driving. The questionnaire showed that 71 % of all private drivers always or almost always carried mobile phones. Of those private drivers, 70 % always or almost always had it activated while driving. That means that approximately 50 % of all private drivers had an activated mobile phone in the car. When the participants in each survey were divided into groups by age and sex, the results still matched quite well. Both surveys showed that younger drivers, more than older ones, had access to mobile phones in their cars. However, TSU92- showed that men more often than women had access to mobile phones while driving, except for the youngest group, 18 to 24 years old. The questionnaire showed no gender differences for those who always or almost always had their mobile phone in their car. Yet the questionnaire showed that men have the mobile phone activated more often than women.

Both TSU92- and the questionnaire showed gender differences in use of mobile phones. According to TSU92-, approximately 35 % of the male drivers had access to mobile phones while driving, but only 20 % of the female drivers. The questionnaire showed that men made and received significantly more mobile phone calls than women. Both surveys showed that the number of uses and amount of usage of mobile phones increased with mileage driven. The result from TSU92- was relative to the distance travelled. The result from the questionnaire was connected to the yearly mileage and the frequency of the car's use.

According to TSU92-, 17 % of all drivers with access to a mobile phone use hands-free equipment. The questionnaire's results were that 22 % of the private drivers often used some form of hands-free equipment, and 32 % of the working drivers, i.e. a somewhat larger number than the TSU92- results. However, since TSU92- is based on results from 2001, and the questionnaire from the end of 2002 and beginning of 2003, these results can still mirror reality. It is reasonable that an increase in the use of hands-free equipment can have occurred during this time.

The results from both surveys show that there is a correlation between drivers who call frequently or very frequently and their use of seat belts. The results were most pronounced for the young people's group, 18 to 24. The questionnaire showed that frequent users of mobile phones while driving were more lenient towards use of alcohol while driving, (this applies to alcoholic beverage with more than 2.25 % alcohol), more willing to exceed the speed limit, and more likely to consider the traffic as being less risky than the comparison group; which comprised the drivers who seldom or never used mobile phones while driving. The frequent users of mobile phones also drove significantly more than drivers who seldom or never used a mobile phone while driving.

The purpose of the focus group discussions was to give background material to the questionnaire survey. A comparison of the questionnaire results and the focus group discussions reveals that much of what was said in the discussions was generally applicable. As an example, the discussions brought up that younger people more so than older people, read and sent text messages, SMS, even while driving. The questionnaire confirms that the youngest age group, 18 to 24, read and sent three SMS per week, and that the majority of users were men. The average for all age groups, the youngest included, was one text message read or sent per week.

Several in the younger focus group avoided or restricted the use of mobile phones while driving in darkness and especially women were more careful. The questionnaire confirms that more women than men avoided using mobile phones while driving in the dark.

The discussion in the older group stated that conversation time was possibly extended by the use of hands-free equipment. TSU92- as well as the Norwegian study show similar results. This is in all probability a natural behaviour since hands-free makes it easier to manoeuvre a car during a mobile phone conversation.

The focus group discussions as well as the questionnaire showed that women usually put mobile phones in the passenger seat while driving, while men usually have it in their pockets or in a holder on the instrument panel.

Some of the advantages of a mobile phone in the car, which were important in both the discussions and the questionnaire, were the possibility to alarm emergency personnel if necessary, and the possibility to be contacted or contact others, essentially as a security measure.

Many aspects of driver behaviours during mobile phone conversations brought up in the discussion groups also received high response rates in the questionnaire. Typical were minimising of the conversation and speed reduction when there is a mobile phone call. The results from the questionnaire showed that 70 % always or almost always avoided overtaking other cars. The focus group did not discuss avoidance of overtaking, but the older group discussed the anger caused by being passed by someone in a mobile phone conversation. The questionnaire also confirmed that older drivers more often than younger avoided making a mobile phone call or never answered a call while driving. Women were also more likely than men to avoid making or answering a call, when driving. Many from the discussions and the questionnaire planned their conversations to situations when there was little traffic, when traffic was stopped or moved slowly. Between 10 and 15 % responded in the questionnaire that they always or almost always stopped the car to make a mobile phone call. This was something that several in the focus

group discussions expressed a desire to do, but often the traffic environment precluded such actions.

None of the focus group participants had been so concentrated on a mobile phone conversation that they had been involved in any serious incident. However, several of the participants who frequently used their mobile phones while driving, had been so concentrated on their conversation that they had missed exits and traffic signals and their driving had been unsteady with the car swerving laterally. These participants had also reduced their speed too much in relation to the circumstances, especially when driving on a highway while in a mobile phone conversation. This behaviour as a result of concentration on a mobile phone conversation was confirmed by the questionnaire.

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