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Examination of the effectiveness and acceptability of mobile phone blocking technology among drivers of corporate fleet vehicles

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ABSTRACT

There is technology available that can block mobile phones while driving. The aim of this research was to determine if mobile phone blocking technology is an effective and acceptable method for reducing driver distraction among drivers of corporate fleet vehicles. Two different technologies were assessed: one required software to be installed on mobile phones, while the other technology used software in addition to external Bluetooth hardware that paired with the phones. A sample of 104 study participants who regularly drove a corporate fleet vehicle were recruited through SA Power Networks, a major corporation in South Australia. Each participant experienced one of the two technologies, and their opinions on the technology and phone use while driving were assessed using pre- and post-trial questionnaires. A majority of participants reported that phone blocking was not reliable but a majority nonetheless considered the technology they trialled to be an effective way of preventing phone use while driving. The results of this trial suggest that phone blocking products may provide a useful method of changing mobile phone use behaviour while driving. However, the reliability and usability of the products need to improve to reach higher ratings of user acceptance and approval.

KEYWORDS

Mobile phones, driver distraction, phone blocking, technology, intervention, evaluation, questionnaire

Summary

It is widely recognised by safety researchers that mobile phone use affects driving performance and increases crash risk. This is because it places considerable cognitive demands on the driver and draws attentional resources away from the driving task. The most common response has been to ban phone use while driving and utilise enforcement of these laws to reduce its prevalence. However, the long-term effectiveness of such laws for reducing phone use while driving and associated crashes has yet to be proven. As an alternative, there is technology currently available that can block mobile phone calls and message services while driving.

The aim of the present research was to identify and evaluate a few of the more promising technologies and determine if mobile phone blocking is an effective and acceptable method for reducing driver distraction. Two different technologies were chosen to have their performance assessed through a field trial involving drivers of corporate fleet vehicles. One technology (referred to here as 'Technology A') required software to be installed on mobile phones, while the other (referred to here as 'Technology B') used software in addition to external Bluetooth hardware that paired with the phones. With the assistance of the South Australian Motor Accident Commission (MAC), a sample of 104 study participants (97 males, 7 females; age range 25-66, mean=48.9, *SD*=9.1) who regularly drove a corporate fleet vehicle, were recruited through SA Power Networks (SAPN), a major corporation in South Australia. Seventy-six participants trialled Technology A and 28 trialled Technology B for a period of one month (November 2015) during which their phones were blocked only on weekdays. Their attitudes and behaviour with regard to phone use while driving, and their impressions of the phone blocking technologies that they experienced during the trial, were assessed using pre- and post-trial questionnaires.

This study produced mixed results. Participants generally gave a negative appraisal of the two technologies, especially Technology A. Approximately 30 percent of participants reported not even experiencing phone blocking with Technology A, and only 20 percent said that it worked reliably every time. Interestingly, despite its inability on many occasions to block the phone, over 40 percent of participants also agreed or strongly agreed that it prevented phone use when it should not have done.

There were also problems with accessing the phone at the end of a drive. Only 30 percent reported that they were satisfied with its performance. Technology B received a more favourable appraisal but participants still reported that they had difficulties overriding it when required and that it sometimes prevented phone use when seated in the vehicle as a passenger. Participants reported significantly greater battery drain with Technology B compared to Technology A. Despite these problems, around two thirds of the participants were satisfied with its performance.

Participants held negative attitudes to phone use while driving before the trial, which could be due to their recruitment from a corporation with a strong driving safety culture. This made it difficult to detect any increase in the recognition of the risk of phone use while driving following the trial. The only items concerned with phone use attitudes which did demonstrate an effect were those related to phone blocking technology being a 'good idea': support for this idea dropped significantly following the trial, no doubt reflecting the negative experiences many participants had with the technologies. In keeping with the generally negative attitudes to phone use while driving, there were low levels of self-reported phone use even before the trial commenced. Despite this, the trial did result in reductions in this behaviour. There were increases during the trial in the likelihood of participants 'rarely' or 'never' making or answering calls, or reading text messages, regardless of which technology they trialled.

The results of this trial suggest that phone blocking products may provide a useful method of changing mobile phone use behaviour while driving. However, the reliability and usability of the products need to improve to reach higher ratings of user acceptance and approval. A number of issues with the operation of the two technologies were identified in this trial, which will need to be addressed in order to support a recommendation for wider implementation or promotion of phone blocking as a countermeasure for phone use while driving.

Contents

1 Introduction

1.1 Mobile phone use and crash risk

It is widely recognised by safety researchers that mobile phone use affects driving performance because it places considerable cognitive demands on the driver, drawing attentional resources away from the driving task. Indeed, there is evidence suggesting that mobile phone use while driving increases the risk of a crash (Dingus et al., 2016; Elvik, 2011; McEvoy et al., 2005). McEvoy et al. (2005), in one of the most notable Australian studies in this area, examined the mobile phone records of crash-involved drivers and found that a driver is four times more likely to have a crash resulting in injury when using a mobile phone, irrespective of the handset used. A more recent study by McEvoy, Stevenson and Woodward (2007) involved interviews with hospital-treated drivers in Western Australia and found that 30 percent of drivers were distracted prior to the crash, including two percent who were using a mobile phone. Elvik (2011) undertook a meta-analysis of studies examining crash risk and phone use. Elvik noted that methodological issues had resulted in heterogeneous results but nonetheless determined a point estimate of an increased risk of a crash when using a mobile phone of 2.9.

In a more recent study, Dingus et al. (2016) analysed 905 crashes in a naturalistic driving study in the US. They found an increased odds ratio for various forms of hand held phone use in crash incidents, including: browsing on a mobile phone, dialling a phone, reaching for a phone, sending a text, and speaking on a phone. The overall odds ratio for hand held phone use in the crashes was 3.6 (95% confidence limits of 2.9 to 4.5) (Dingus et al., 2016).

1.2 Possible means to reduce mobile phone use while driving

The most common response to this issue has been to ban phone use while driving and utilise enforcement of these laws to reduce its prevalence. An important question then becomes whether laws against using a phone while driving are effective at reducing phone use and associated crashes. In their review of this literature, Kircher, Pattern, and Ahlstrom (2011) of VTI in Sweden concluded that bans on phone use while driving tend to produce compliance in the first year but that phone use frequency returns to baseline levels after that. The review of EU states by Janitzek, Brenck, Jamson, Carsten, and Eksler (2010) also found that the severity of penalties had no effect on self-reported phone use rates while driving, and that self-reported use rates were also similar in countries with and without phone ban legislation. It is possible, however, that these findings all reflect insufficient enforcement.

Another interesting finding emerged from a naturalistic driving study of commercial truck drivers in the US (Hickman & Hanowski, 2010; Hickman et al., 2011). It was found that drivers' levels of mobile phone use while driving were consistent with fleet or company rules rather than with state legislation. This suggests that there is the capacity for fleet managers to influence drivers' mobile phone use more effectively than legislators. There are Australian corporations that have enacted or are considering enacting mobile phone bans for their vehicle fleet (Small, Bailey & Lydon, 2013), including the South Australian Department of Planning, Transport and Infrastructure. As occupational health and safety requirements are becomingly increasingly stringent, it is likely that preventing phone use by drivers of fleet vehicles can be accomplished using Workplace Health and Safety legislation or regulations.

Given the equivocal findings of research into the outcomes of legislation prohibiting various forms of mobile phone use while driving, consideration needs to be given to alternative methods of controlling phone use. One option is to use technological means to restrict mobile phone operation when people are driving.

1.3 The present study

The *South Australian Road Safety Action Plan 2013-2016* has outlined a considerable number of key actions to help reduce serious casualties by at least 30 percent by 2020. One such action is to "Promote voluntary use of technology solutions that block incoming phone calls and messages while driving". The South Australian Motor Accident Commission (MAC) contracted the Centre for Automotive Safety Research to identify and evaluate a few of the more promising technologies.

Thirty-three products were briefly reviewed based on information available from publicity material on the Internet or details on 'app' (software application) stores. Around 21 products were claimed to be able to block incoming phone calls and messages. These were predominantly effective on Android based smart phones, while only a few products were claimed to be able to block incoming phone calls and messages on both iPhones and Android-based smart phones.

Three commercially available products from international technology firms were selected for the trial. The short listed technologies (one software and two hardware) were new to the Australian market and were pre-trialled by a small group of participants including the authors of this report. One of the hardware solutions was required to be plugged into a vehicle's on-board diagnostics (OBD-II) port. The hardware acquired the vehicle's speed from the OBD-II port and triggered blocking (via Bluetooth) on mobile phones installed with proprietary software. This product had to be excluded from the study when it was found in the pre-trial testing that the hardware was drawing power from the OBD-II port of some vehicles, even when the vehicle was completely inactive. This resulted in unacceptable vehicle battery drain and affected the vehicle's ignition system. Various software bugs and minor software issues were also revealed for the other two products during the pre-trial testing, and were reported to the technology providers so issues could be resolved prior to the larger scale trial.

Following the pre-trial testing, the aim of the study was to assess the performance of the two remaining phone-blocking products in a larger field trial using a corporate vehicle fleet. With the assistance of the South Australian Motor Accident Commission (MAC), SA Power Networks accepted an invitation to be involved in the study, permitting access to their staff as a potential source of volunteers to trial the two different phone blocking technologies. Study participants were asked to report their attitudes and behaviour with regard to phone use while driving, and their impressions of the phone blocking technologies that they experienced during the trial.

2 Method

2.1 Participants

Participants were recruited through SA Power Networks, a major corporation based in South Australia. SA Power Networks assisted with promoting the project to its staff and organised information sessions at which CASR project team members described the study, explained how the various technologies worked, and invited staff to participate. Staff were reassured that their involvement in the study was voluntary and that they were free to withdraw at any time. Additionally, staff members were assured that if they participated they would remain anonymous, and that the corporation would not be informed who did or did not volunteer to participate. The study was approved by the University of Adelaide's Human Research Ethics Committee.

A total of 150 staff members registered an interest in being involved in the trial. Full participation in the study required a completed consent form and completion of both the pre- and post-trial surveys. The exclusion of participants who did not meet these requirements reduced the sample to 104 (97 males, 7 females; age range 25-66, mean=48.9, *SD*=9.1). The sample included employees in a range of roles within the organisation, including corporate, technical, fieldwork, IT, and customer-focused. Each of the participants had work-issued and supported Apple iPhone 5C mobile phones operating on iOS 8 software or above. As one of the technologies being examined required a hardware device fitted to the vehicle, that technology was trialled on staff members with access to their own fleet vehicle. There were 28 participants who trialled the hardware technology, with the remaining 76 trialling the technology which was software-based only.

2.2 Materials

2.2.1 Phone blocking technologies

There were two technologies assessed in this trial, which will hereafter be referred to as 'Technology A' and 'Technology B'. Both technologies work on iPhones (in addition to Android based phones), which was important for the project, as the work phones provided to participants by their organisation were all iPhones.

Technology A

Technology A was a proprietary software application ('app') that is downloaded onto a mobile phone. Once the software is activated, it relies on the phone's GPS as an internal 'trigger' to activate the software's phone blocking features (blocking calls, texts, app use). Blocking is triggered in this way when the phone is determined to be travelling above a threshold speed (around 20 km/h) for at least a minute.

Technology A, when in blocking mode, silences phone calls and SMS texts (although vibration notifications still occur if not specifically disabled). Phone calls can be answered while driving but this is reported as a violation in an associated web-based monitoring portal, and the user is given a written warning on the phone screen. The software thwarts (or 'blocks') phone use by returning the user to the mobile phone's lock screen (with an accompanying written warning on the screen) when any attempt at unlocking the phone occurs. All phone use attempts are reported as violations in the web-based monitoring portal. When in blocking mode, phone calls cannot be made, SMS texts cannot be sent, SMS texts cannot be answered, and other apps cannot be used (except for permitted navigation software). Hands free calls can be made using voice recognition ('Siri' on the iPhone). There is an emergency button, which can be used to dial '000'. As Technology A activates blocking on the basis of

movement of the phone, it activates on public transport or on a bicycle, or as a passenger in a vehicle. There is a passenger override button that can be accessed and can be used to disable the blocking once it has commenced during a drive. When the phone ceases moving for more than around a minute (at the end of a drive), blocking automatically ceases. This delay in blocking termination is set to avoid phone use during intermittent vehicle stops, such as at traffic lights or during congestion. However, an 'end of drive' button can be accessed to disable blocking immediately after cessation of driving. If the software is deactivated at any time by 'swiping' off the app, a single written warning is given to the phone user on screen, and the software remains inactive until it is activated again manually by the user or automatically (with an extended delay) through a function in the software. Software activity or inactivity is monitored by the web-portal on a central server, which attempts communication with the phone/software on a daily basis.

There are many other features available to users of Technology A and this technology is aimed at providing a mobile phone blocking solution and mobile phone monitoring system on a fee per month basis ($5 per month, per phone). Organisations can monitor employee phone use while driving and, similarly, parents can monitor the phone use of their driving aged children. Infractions, such as attempted phone use or tampers, passenger mode activations, end of trip activations, genuine short message service (SMS) texts received or sent from the phone (but not iPhone messages), calls made and received on the handset or by hands-free, are also recorded by the software and reported on the web-portal. An organisation or parent can use the reports to enforce various mobile phone policies. For example, if a mobile phone policy specifies no phone use whatsoever on company time, any phone use is time and location stamped and can be examined by an organisation/parent and used as evidence. As this technology uses 'location services' and the iPhone's GPS, if the user disables location services, it will render the software ineffective, and this will be reported on the web-portal as such.

Technology A, through the web-portal settings also allows various adjustments to the blocking parameters, such as allowing calls to be made to particular 'white-listed' numbers or receiving calls from white-listed numbers, specifying days and time-periods for blocking, disabling passenger and end of trip access and allowing or disallowing various navigation applications, music applications or hand-free use on the phone.

As noted above, Technology A was trialled by 76 study participants.

Technology B

Technology B also requires proprietary software downloaded onto the phone but uses a hardware trigger to activate the software's phone blocking features. This hardware, which was mounted to the windscreen of each participant's vehicle, communicates with the participant's phone via a forced Bluetooth connection. The hardware incorporates both an accelerometer and GPS to detect vehicle motion and once a speed threshold (around 20 km/h) is exceeded, it communicates to the phone and software via Bluetooth, activating blocking of a phone equipped with matching software and 'paired' with the device.

Technology B only operates when in the presence of a hardware device with which it has been paired. When the app is opened for the first time, it searches for a hardware device using Bluetooth and when it finds one, the person with the phone is asked to authorise pairing. After the initial pairing, the software forces Bluetooth and this cannot be deactivated on the phone unless the software is removed. When in blocking mode, Technology B prevents phone calls from being answered by intercepting incoming calls (sometimes after a one ring delay) and diverting them to message bank.

Additionally, the driver also receives an audio message indicating that a call from a particular number or person has been blocked.

In a similar manner to Technology A, Technology B blocks phone use by returning the user to the mobile phone's lock screen (with an accompanied written warning on the screen), when any attempt at unlocking the phone occurs. Hence, phone calls cannot be made and SMS texts cannot be sent. Additionally, SMS text alerts are made less overt and cannot be answered by a driver. However, people who send SMS texts to a driver being actively blocked by Technology B receive an automatic SMS text reply notifying them that the person to whom they have sent a message is driving and cannot reply. This is a unique feature of Technology B and required no intervention by the driver. Music and navigation apps still work but all apps can be blocked if required. There is also a passenger override button. If a phone call is made while stationary, the technology also terminates any phone calls once the hardware device and paired phone begin moving in the vehicle. The phone continues to block for around 30 seconds after a drive has ended (again to avoid phone use during intermittent vehicle stops) but there is a 'fast release' button to end blocking immediately after the end of a trip. If the software is deactivated at anytime by 'swiping' off the app, a persistent written warning (on-screen) is given to the phone user until the software is re-activated. Phone use attempts are also reported as violations on a web-based monitoring portal, in addition to other driver metrics such as driver over-speed, harsh braking and excessive acceleration.

There are many other features available to users of Technology B and this technology is aimed at providing a mobile phone blocking solution with some mobile phone use monitoring for organisational users, with a fee for the hardware (around $200-$300) and an on-going fee ($5 per month, per hardware unit). However, for the purpose of the trial the units were provided without charge.

Similarly to Technology A, some degree of phone use monitoring while driving is also available. Technology B also allows various adjustments to be made to the blocking parameters through the web-portal settings, such as allowing calls to be made to particular 'white-listed' numbers or receiving calls from white-listed numbers, specifying days and time-periods for blocking, disabling passenger and end of trip access, and allowing or disallowing various navigation applications, music applications or hand-free use on the phone, and extending or shortening the end of drive periods. As this technology only used 'location services' for features in addition to phone blocking, if the user disables location services, the software still remains effective.

One feature that was innovative with Technology B was that the hardware could be set-up to activate mobile phone blocking when a particular paired phone was within the driver compartment of the vehicle only, while allowing the same phone to be used elsewhere in the vehicle without being affected by the phone blocking technology. However, the authors of this study did not achieve any success with this feature.

There were a few issues (beyond our control) that resulted in only 28 participants being recruited to trial Technology B. The two main issues were difficulties in obtaining sufficient Technology B hardware units for the study in a timely manner and, that participants using Technology B required exclusive use of a fleet vehicle. This limited the size of the sample for Technology B.

2.2.2 Questionnaires

Two questionnaires were used for this study: one administered to participants before the phone blocking trial and one administered post-trial. The pre-trial questionnaire consisted of 28 items. The first four items consisted of demographics, items 5 to 13 were concerned with attitudes to use of a mobile phone while driving, items 14 to 21 were concerned with self-reported phone use while driving, and items 22 to 28 were concerned with perceptions regarding the use of phone blocking technology

to prevent phone use while driving. All items were scored on a seven point Likert scale from 'Strongly agree' to 'Strongly disagree' (Q 5-13 and 22-28) or from 'Everytime' to 'Never' (Q14-21). There was also an open response field for any other comments regarding mobile phone use while driving.

Items for attitudes to phone use while driving included references to hand held and hands free phone use, sending and reading text messages, and the person themselves versus a 'typical driver'. Sample items are: 'It would be dangerous for me to have a 'hands free' phone conversation on my mobile phone while driving' (Q5) and 'It is dangerous for a typical driver to send a text message while driving' (Q12). Items for self-reported phone use referred to making and answering calls, and sending and reading text messages, and made a distinction between the use of a work vehicle and the person's own vehicle. Sample items include: 'How often do you answer a phone call while driving a work vehicle?' (Q16) and 'How often do you receive and read a text message while driving your own vehicle for non-work purposes?' (Q21). Items concerned with phone blocking technology assessed beliefs about its effect on safety and its deleterious effects on work. Sample items include: 'I think mobile phone blocking technology would make me a safer driver' (Q23) and 'I think that not being able to communicate with others using my mobile phone while driving will make work more stressful' (Q25). A full copy of the pre-trial questionnaire is supplied in Appendix A.

The post-trial questionnaire contained 51 items, many of which were the same as in the pre-trial questionnaire. Items 1 to 13 remained the same (demographics and attitudes to phone use while driving). Items 14 to 21 (self-reported phone use while driving) remained the same but asked about behaviour during the phone blocking trial. A sample item is: 'How often during the trial did you answer a phone call while driving a work vehicle?' (Q16). Items 22 to 27 were not from the pre-trial questionnaire. They asked for specific information relating to the technology, including which technology they trialled ('Technology A' or 'Technology B'), whether it blocked their phone calls at all during the trial ('Yes' or 'No'), whether it worked reliably ('Rarely', 'Some of the time', 'Most of the time' or 'Every time'), whether they tried to test the technology (as a driver and passenger: 'Never', 'Once' or 'A few times'), how often their phone was connected to a hands free device while driving ('Never', 'Sometimes' or 'Always'), and whether they were aware that hands free calls would not be blocked ('Yes', 'No' or 'Unsure').

Items 28 to 32 and 39 to 40 were the same as 22 to 28 in the pre-trial questionnaire (perceptions regarding the use of phone blocking technology to prevent phone use while driving) but were reframed in terms of experiences of the technology during the trial. A sample item is: 'The phone blocking technology I experienced during the trial made me a safer driver' (Q29). Items 33 to 38 were additional questions using a seven-point scale ('Strongly agree' to 'Strongly disagree'), which asked about other aspects of the experience of the blocking technology. A sample item is: 'The phone blocking technology depleted my phone battery to a degree that caused me inconvenience' (Q38).

Items 41 to 43 were additional questions about using the technology, including how often they used the passenger override feature (Q41), whether they had any problems accessing their phone after a journey ended (Q42) and whether they ever closed or swiped-off the app (Q43), with responses recorded on a four point scale ('Never', 'Once', 'A few times', or 'Frequently'). Item 44 asked those who closed or swiped-off the app what their reason for doing so was (response options provided as well as an open response field). Item 45 asked those who closed or swiped-off the app whether they realised the app would not work ('Yes' or 'No'). Item 46 asked whether they would recommend the technology as a way to prevent mobile phone use while driving ('Yes or 'No') and item 47 provided an open response field to specify why they would or would not recommend it. Item 48 required participants to rate the technology on a scale of 10 ('Excellent') to 0 ('Very poor'). Items 49 to 51 provided open response fields to specify anything about the technology that was troublesome or

annoying, any improvements that could be made, and any final comments regarding the trial or the technology. A full copy of the post-trial questionnaire is supplied in Appendix B.

2.3 Procedure

Representatives from SA Power Networks set up recruitment sessions at their head office and metropolitan branches around Adelaide. A CASR project team member delivered a presentation about the trial and the two technologies. Those interested in being involved were provided with a consent form, information sheet and the pre-trial paper-based questionnaire and reply paid return envelope. Instructions were given on how to download and activate Technology A. Technology B required drivers with access to their own company car rather than a pool vehicle, and so specific staff members were invited to information sessions about Technology B. Those interested were given a hardware device, paired to their own phone, to install in their vehicle. Instructions were given for how to install the device. The trial lasted in each case for one month (November 2015). As the technologies were set only to block phones on weekdays, this gave a maximum of 22 days of blocking. Phones were blocked for the full 24 hours (while driving) on these days. After the month long trial ended, invitations to complete an online (Survey Monkey) post-trial survey were sent to participants' email addresses. All participants who completed both the pre- and post-trial questionnaires were entered into a draw to win an iPad mini.

During the blocking trial it was noted within the web administration portal that a number of users of Technology A were de-activating the software in some way (swiping it off, or deleting it, or switching off location services). Bulk e-mail and SMS text reminders were sent to those users on three occasions reminding participants to keep the software active and not swipe it off.

2.4 Analysis

Responses to the questionnaire were compared for the two groups of participants who experienced the two different technologies. For responses to individual items scored on Likert scales, comparisons were made using Chi-square tests. Responses to questions about attitudes to phone use while driving and the phone blocking technology, and self-reported phone use while driving were summed, and the resulting variables were compared using Repeated Measures Analysis of Variance, with Time (pre- and post-trial) treated as a Within-Subjects factor, and the Technology trialled treated as a Between-Subjects factor. Two-tailed tests were conducted for all analyses with an alpha level of 0.05 to determine statistical significance.

3 Results

3.1 Overall experiences

When asked if they had experienced phone blocking while driving, 53 participants trialling Technology A (69.7%) and all 28 participants trialling Technology B stated that they had. Figure 3.1 shows the reported reliability of the two technologies. It appears that more participants reported that Technology B was reliable 'most of the time' or 'every time'. These apparent differences were approaching statistical significance only, according to a Chi-square test ($X^2(3, N = 104) = 7.4$; $p=.061$).

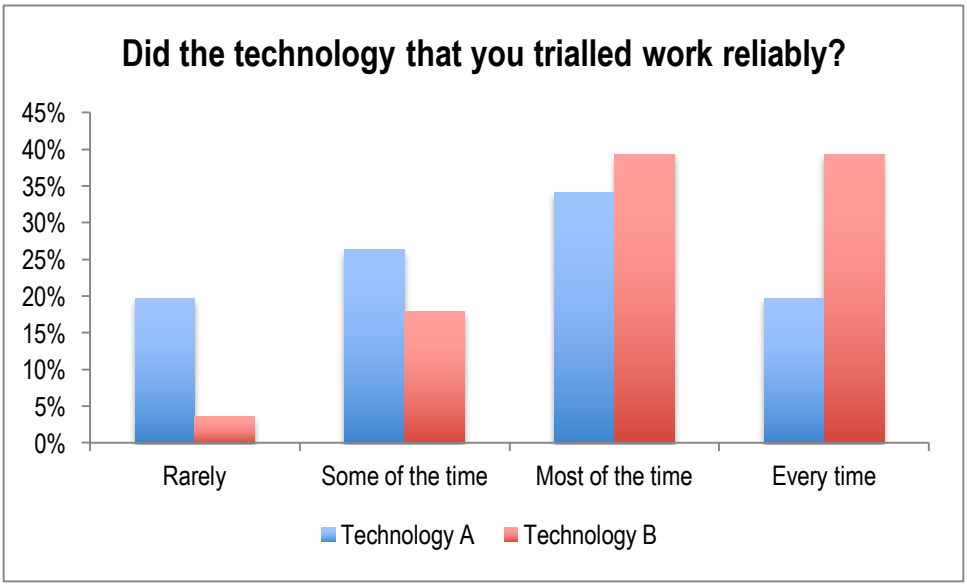

Figure 3.1
Reported reliability of the technology, percentages of *n*=76 participants for Technology A and *n*=28 for Technology B

Table 3.1 shows that a minority of users of Technology A strongly agreed or agreed that it worked as it was supposed to, that they were able to override it when they should have been able to, that they were able to use their phone as a passenger, that it prevented phone use when it should not have, that they were satisfied with the technology's performance, and that it depleted the phone's battery (a full table of responses on the seven-point scale is provided in Appendix C). Chi-square tests indicated that users of Technology B were significantly more likely to strongly agree or agree that the technology they trialled worked as it was supposed to ($\chi^2(1, N=103)=16.8$; $p<.001$) and performed satisfactorily ($\chi^2(1, N=101)=11.3$; $p=.001$) but that it depleted the battery ($\chi^2(1, N=102)=20.8$; $p<.001$). There were no significant differences between the two technologies with regard to the ability to override the technology ($\chi^2(1, N=103)<.1$; $p=.950$), the ability to use the phone as a passenger ($\chi^2(1, N=103)=3.1$; $p=.079$) and whether the technology prevented phone use when it should not have ($\chi^2(1, N=102)=3.6$; $p=.060$).

Table 3.1
Participant experiences of the two phone blocking technologies

	Technology A (*n*=76)	Technology B (*n*=28)
	% Strongly Agree or Agree	
Worked as it was supposed to*	33.3	78.6
Able to override	17.3	17.9
Able to use phone as a passenger	40.0	21.4
Prevented phone use when it should not have	42.7	22.2
Satisfied with performance of the technology*	29.7	66.7
Depleted the phone battery*	35.1	85.7

* p value for chi square test <.05

Table 3.2 demonstrates that self-reported use of the passenger override function was low (a full table of responses on the four-point scale is provided in Appendix D). A majority of participants reported that it was 'never' used, either by them (as the driver or passenger) or by any other passenger in the vehicle. There were no differences in the responses to these items between participants who trialled Technology A and those who trialled Technology B ($\chi^2(1, N=104)=.1$; $p=.738$, $\chi^2(1, N=101)=1.9$; $p=.170$, and $\chi^2(1, N=100)=.0$; $p=1.000$, respectively). The participants did experience problems accessing their phone after a journey had ended, with 59.1% of participants reporting 'once', 'a few times' or 'frequently' for Technology A and 50% of participants reporting this for Technology B. These responses did not differ between Technologies A and B ($\chi^2(1, N=104)=.7$; $p=.400$). Also, a majority of the participants closed or swiped-off the app 'once' or 'a few times' during the trial, but the frequency that this occurred did not differ between Technologies A and B ($\chi^2(1, N=104)=.0$; $p=.986$).

Table 3.2
Participants' responses to questions concerning the use of Technology A (*n*=76) and B (*n*=28)

	% Never	% Once, A few times or Frequently
How often did you use the passenger override feature as a driver?		
Technology A	86.8	13.2
Technology B	89.3	10.7
How often did you use the passenger override feature as a passenger?		
Technology A	64.4	35.6
Technology B	78.6	21.4
How often did another passenger use the passenger override feature?		
Technology A	75.0	25.0
Technology B	75.0	25.0
Did you have any problems accessing your phone after a journey ended?		
Technology A	40.8	59.1
Technology B	50.0	50.0
Did you ever close or swipe-off the phone-blocking app during the trial?		
Technology A	35.5	64.4
Technology B	35.7	64.3

* p value for chi square test <.05

The participants who reported that they closed or swiped-off the app (49 for Technology A and 18 for Technology B) were asked to specify their reason for doing so, and the results are shown in Figures 3.2 and 3.3. The most common reason for Technology A was that it occurred accidentally, followed by a desire to conserve the phone battery, that it had become a habit to do so, for 'other reasons', and that they did not want their phone to be blocked. The reasons for Technology B were slightly different, with a desire to conserve the phone battery the most common, followed by accidentally closing or swiping-off the app, that it had become a habit to do so, that they did not want their phone to be blocked, and for 'other reasons'. The other reasons for Technology A included:

- Having to restart the phone to refresh it.
- The app made it impossible to use the phone while on public transport.
- The app blocked the phone while walking.

- It was a requirement of work to be in contact with manager.
- The app continually blocked the phone after the vehicle had stopped.
- Being overseas and wanting to reduce data usage.

The one other reason that was provided for Technology B was that the battery went flat and the app had to be reactivated.

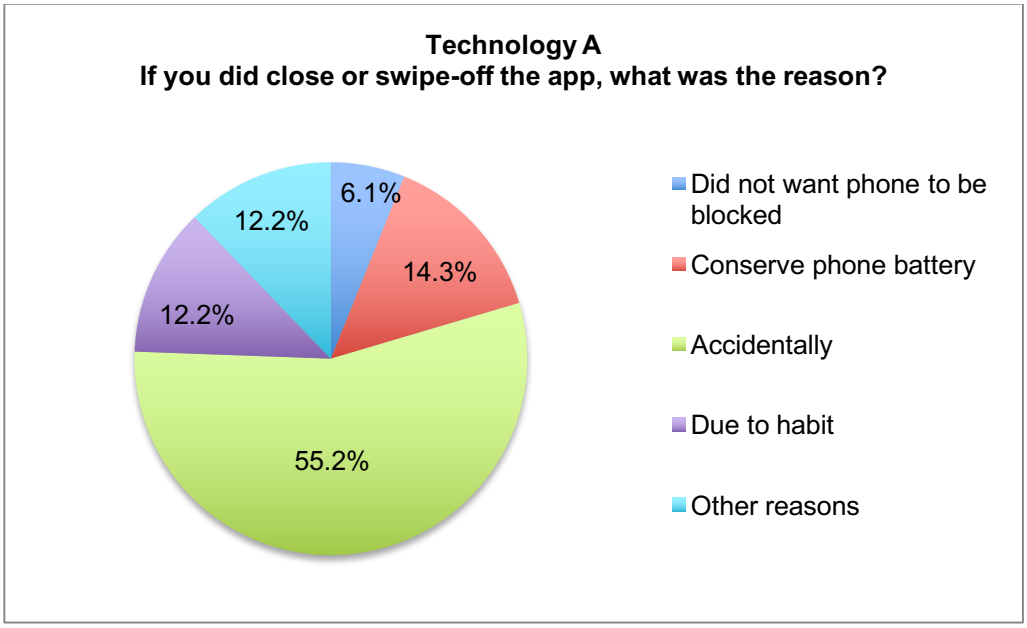

Figure 3.2
Percentages of 49 participants who trialled Technology A
and closed or swiped-off the app, according to their reason for doing so

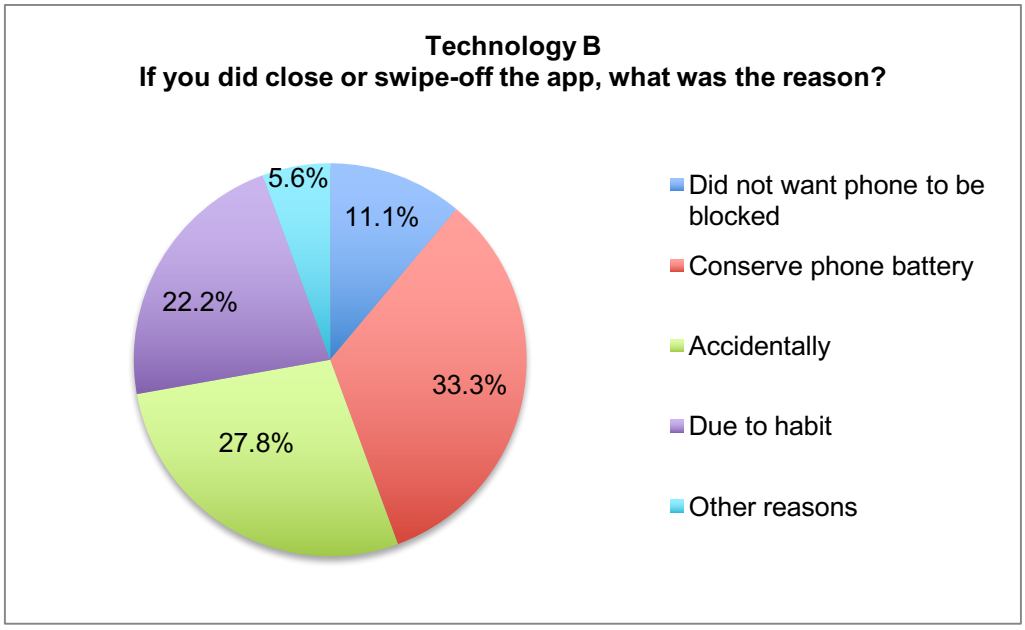

Figure 3.3
Percentages of 18 participants who trialled Technology B and closed or swiped-off the app,
according to their reason for doing so

Participants were also asked whether they realised that the app would not work after it had been closed or swiped-off. Fifty-seven (75.0%) participants who trialled Technology A responded 'yes' and 19 (25.0%) responded 'no'. In comparison, 24 (85.7%) participants who trialled Technology B responded 'yes' and 4 (14.3%) responded 'no'.

The participants were asked whether they would recommend or not recommend the technology they trialled as a way to prevent drivers from using mobile phones while driving. For both technologies, a majority of participants reported that they would recommend the technology they used (60.5% for Technology A and 64.3% for Technology B). The responses did not significantly differ between the two technologies ($\chi^2(1, N=104)=.1$; $p=.727$). They were also asked to specify the reasons why they would recommend or not recommend the technology. Fifty-five (52.9%) of the total sample of 104 participants provided reasons for why they would recommend the technology and 39 (37.5%) provided reasons why they would not. A full list is provided in Appendix E.

The most common responses for recommending the technology were that:

- It removes the distraction of having a phone in the car, so that drivers can concentrate on driving.
- It is a good way to prevent people using their phones while driving.
- It leads to safer drivers on the road.
- It makes the driver aware of what they are doing when they go to use their phone while driving.

The most common reasons for not recommending the technology were that:

- It is important that people are contactable because communications at work are essential. This technology limits the ability to communicate. Therefore, it needs to be possible to use phones while driving for certain important calls.
- It is frustrating when phones cannot be used.
- It is disruptive to the phone in general. It often did not block phone use when it should have (i.e. when driving) but block it when it did not need to (e.g. when walking, at home, on public transport). It also drained the phone battery.
- The time delay between when the vehicle was stopped and when the phone could be used again was 'annoying'. It wastes time and hinders work performance. It was not possible to simply pull over and make or take a call. It was reported that the delay could take up to half an hour.
- The technology did not work consistently or reliably.
- It was difficult to select the passenger mode that disables the blocking of the phone.
- The technology has too many flaws and needs further development.
- Bluetooth and hands free phone capabilities are safe, so there is no need for this technology

When asked to rate the technology they trialled on a scale from 10 (excellent) to 0 (very poor), based on their overall experience with it, the average ratings were 5.5 ($SD=2.7$) for Technology A and 6.8 ($SD=2.0$) for Technology B. The difference in the two ratings was found to be statistically significant ($t_{(64.8)}=2.6$; $p<.05$). Therefore, Technology B was viewed more favourably than Technology A.

The participants were asked to specify anything about the way the mobile phone blocking technology worked that they found troublesome or annoying. A total of 81 participants provided responses. A full list is provided in Appendix F.

The more common points relating to both Technology A and B were that:

- It was difficult to select the passenger mode to disable the phone blocking. It was even reported that the phone had to be turned off and the app disabled so a passenger could use the phone.
- The app drained the phone battery. It was reported that the battery could completely flatten on a long journey.
- The phone could not be used for a period after the vehicle had stopped, reportedly up to thirty minutes. Therefore, it was not possible to pull over and make or take a call.
- The app did not work reliably or consistently. In particular, it often did not block phone use when it should have (i.e. when driving) and did when it did not need to (e.g. when walking).
- The passenger mode had to be repeatedly selected to use the phone when travelling on public transport.

Finally, the participants were asked to identify any improvements they thought could be made to the technology they trialled or any other comments they had regarding the trial or the technology. A full list of suggested improvements (from *n* = 58 respondents) is provided in Appendix G and a full list of other comments (from *n* = 38 respondents) is provided in Appendix H.

Many of the suggested improvements for both Technology A and B were to:

- Reduce the amount that the apps drain the mobile phone battery.
- Allow the phone to be used immediately after the vehicle has stopped, or at least reduce the time delay before the phone can be used.
- It should not be so easy or convenient to override the technology through passenger mode. Although some participants thought it was too difficult to disable the phone blocking through passenger mode and should be easier.
- The app needs to work more reliably and consistently.
- The app needs to be able to correctly block phone use while driving but not while walking.
- Bluetooth and hands free phone use should be allowed as this is legal and there has to be a way to take important calls while driving.
- Some important calls should be passed through, such as calls from the control room at the organisation involved in the study.

Similarly, many of the 'other comments' by participants who trialled either Technology A or B were negative and identified the limitations of the technology listed above, such as the drain on the phone batteries, the long time delay after the vehicle had stopped, that Bluetooth and hands free capabilities should not be blocked, the difficulty of selecting passenger mode and that the app was unreliable and inconsistent. Other common comments were that:

- The participants often just stopped the app from working by either deleting it or swiping it off.
- The app causes additional distraction when trying to respond to it while driving and this could increase risk.
- Drivers should not need an app to tell them what to do, they should drive safely anyway.
- There is already a policy at the organisation that employees are not allowed to use their phone at all while driving a fleet vehicle.

The Authors examined the issue of the accelerated depletion of the phone battery through overnight phone tests. It was found that iPhone battery percentage could reduce by 2 to 3% per hour overnight

(from 100% down to 83% in 7.8 hours or 100% to 74% in 8.8 hours) with only Technology A utilising location services and no other apps active. Similarly, further tests by the Authors found that iPhone battery percentage could reduce by 2% per hour overnight (from (99% down to 83% in 7.75 hours) with only Technology B utilising location services and no other apps active. This suggests that battery depletion is minimal and would not be an inconvenience when the app is in a standby state but, as reported by participants, may be a greater problem when the app is in an active state and/or other phone functions are active.

There were some positive other comments provided. Several participants suggested that phone-blocking technology is a good idea but it needs further development.

3.2 Effects on attitudes and behaviour

Table 3.3 shows participant responses to items regarding attitudes to using a phone while driving, before the trial and after having experienced the phone blocking technologies (a full table of responses on the seven-point scale is provided in Appendix I). Participants generally regarded sending and reading text messages and making hand held phone calls while driving as dangerous, while hands free phone calls were less likely to be regarded as dangerous. There appeared to be a tendency for participants to view phone use while driving as marginally more dangerous for the 'typical driver' rather than for themselves. Ratings of the danger of phone use while driving remained high after the trial. There was a reduction, as indicated by paired samples *t* tests performed on the entire sample, in the belief that phone blocking was a good idea for themselves ($t_{(103)}$=3.4; p<.01) or for the typical driver ($t_{(103)}$=3.9; p<.001).

Table 3.3
Attitudes to phone use while driving, for participants who trialled Technology A (*n*=76) and those who trialled Technology B (*n*=28)

	Technology A (*n*=76)		**Technology B (*n*=28)**	
	% Strongly Agree or Agree			
	Pre-trial	Post-trial	Pre-trial	Post-trial
Dangerous for me to make hands free call when driving	33.3	30.3	28.6	28.6
Dangerous for me to make hand held call when driving	90.7	90.8	89.3	92.9
Dangerous for me to send a text when driving	97.3	98.7	100.0	100.0
Dangerous for me to read a text when driving	96.0	90.8	89.3	100.0
Good idea to use phone blocking when driving a work vehicle	57.9	43.2	53.6	57.1
Dangerous for typical driver to make hands free call when driving	45.3	50.0	39.3	50.0
Dangerous for typical driver to make hand held call when driving	94.7	96.1	88.9	100.0
Dangerous for typical driver to send a text when driving	100.0	98.7	100.0	100.0
Good idea for a typical driver to use phone blocking when driving	61.8	46.1	60.7	60.7

Table 3.4 shows participant responses to items regarding attitudes to phone blocking, before the trial and after having experienced the phone blocking technologies (a full table of responses on the seven-point scale is provided in Appendix J). Participants were unsure about the benefits of phone blocking before the trial but did not foresee a high likelihood of interference with necessary work tasks or communication. A minority thought it would make them a safer driver. After experiencing phone blocking, participants were more likely to indicate that phone blocking would have negative effects on their work (sum of the items referring to interference with work, tasks being more difficult, work being more stressful, and communication being prevented) ($F_{(1)}$ = 8.5; p<.01) and were less likely to think phone blocking would have positive effects (sum of items referring to improvements in safety and being worthy of consideration for their own vehicle) ($F_{(1)}$=19.4; p<.001). There were no differences in the extent to which attitudes changes for the two different technologies.

Table 3.4
Attitudes to phone blocking technology, for participants who trialled Technology A (*n*=76) and those who trialled Technology B (*n*=28)

	Technology A (n=76)		Technology B (n=28)	
	% Strongly Agree or Agree			
	Pre-trial	Post-trial	Pre-trial	Post-trial
Phone blocking would interfere with work	15.8	32.9	10.7	21.4
Phone blocking would make you a safer driver in your work vehicle	39.5	21.1	42.9	32.1
Phone blocking would make work tasks more difficult	23.7	38.7	10.7	17.9
Phone blocking would make work more stressful	9.2	22.7	7.1	7.1
Phone blocking would prevent important communication	19.7	28.0	14.3	32.1
Phone blocking would make you a safer driver in your personal vehicle	41.9	21.3	44.4	35.7
Would consider phone blocking in my own vehicle	32.4	20.0	40.7	35.7

Table 3.5 shows self-reported phone use while driving among the participants (a full table of responses on the seven-point scale is provided in Appendix K). Participants reported low levels of phone use, and were especially unlikely to report sending text messages while driving. A repeated measures analysis of variance found that overall phone use while driving reduced during the trial phase compared to beforehand ($F_{(1)}$=62.2; p<.001) but that there was no differential effect according to the type of phone blocking technology experienced.

Table 3.5
Self-reported behaviour in regard to phone use while driving, for participants who trialled Technology A (*n*=76) and those who trialled Technology B (*n*=28)

	Technology A (n=76)		Technology B (n=28)	
	% Strongly Agree or Agree			
	Pre-trial	Post-trial	Pre-trial	Post-trial
Frequency make phone call in work vehicle	76.3	88.0	53.6	89.3
Frequency make phone call in own vehicle	60.0	75.0	42.9	78.6
Frequency answering phone in work vehicle	70.7	82.9	42.9	89.3
Frequency answering phone in own vehicle	48.7	68.4	21.4	67.9
Frequency send text in work vehicle	97.4	100.0	89.3	92.9
Frequency send text in own vehicle	89.5	96.1	85.7	92.9
Frequency read text in work vehicle	88.2	96.0	75.0	89.3
Frequency read text in own vehicle	72.4	89.5	67.9	89.3

4 Discussion

The purpose of the present study was to trial two phone blocking technologies with a sample of drivers of corporate vehicles and examine drivers' attitudes and behaviour with regard to phone use while driving, and their impressions of the phone blocking technologies they experienced in the trial. This study produced mixed results, with reports of poor performance by the two technologies, no change in attitudes to phone use while driving, but a statistically significant reduction in self-reported phone use during the trial.

4.1 Performance

Participants generally gave a negative appraisal of the two technologies, especially Technology A, which was the software only phone-blocking product. Approximately 30 percent of participants reported not even experiencing phone blocking with Technology A, and only 20 percent said that it worked reliably every time. Interestingly, despite its inability on many occasions to block the phone, over 40 percent of participants also agreed or strongly agreed that it prevented phone use when it should not have done. There were also problems with accessing the phone at the end of a drive. Not surprisingly, only 30 percent reported that they were satisfied with its performance.

Technology B, which involved software paired with a hardware device mounted in the vehicle, received a more favourable appraisal than Technology A, but participants still reported that they had difficulties overriding it when required and that it sometimes prevented phone use when seated in the vehicle as a passenger. Participants reported significantly greater battery drain with Technology B compared to Technology A. Despite these problems, around two thirds of the participants were satisfied with the performance of Technology B and the rating they gave the technology on a scale from 0 to 10 was significantly higher than Technology A. Interestingly, they were not more likely to recommend it as a method for preventing phone use while driving than the participants asked about Technology A.

On the basis of the above, it appears that some improvement is needed in the reliability and usability of both products. However, negative opinions regarding the reliability of Technology A would have been influenced by the fact that quite a few participants habitually 'swiped' off the software, only received one warning from the software and did not always reactivate it despite our reminders (see the 'Limitations' section below). The failure of the phone blocking to occur in these cases was therefore due to the fact that the app had been swiped off or rendered inactive through other means (e.g. turning location services off, deleting app). The habitual swiping off of the app was potentially a by-product of a recommendation from their IT department for phone battery conservation. This was not an issue with Technology B as the software itself provided persistent reminders to re-activate the software if a participant swiped it off.

The issue of battery depletion is difficult to address when the software requires constant monitoring of phone location (to determine phone speed to trigger blocking as required for Technology A). However, in the case of Technology B, 'location services' was not required to trigger phone blocking and was only used for collecting driver metrics, offered in this case as an additional service by the technology provider, so battery depletion may be easier to address for Technology B. The company responsible for Technology A has since attempted to improve battery conservation with various algorithms that detect when the phone is stationary for long periods and put the phone into an energy conservation mode. Since the completion of this trial, significant improvements have also been made regarding the functionality of Technology B.

Based on the opinions of the participants, improvements to the technologies need to be made in terms of both blocking phones when they should and not blocking them when they should not. Aside from situations in which the software has been swiped off, blocking failures can occur for a number of reasons, including problems with the phone's internal GPS, problems with Wi-Fi, software 'bugs', upgrades to the phone's operating system, and software incompatibility. Override functions also need to improve, especially in terms of usability. The issues with the override functions are that they are not particularly intuitive. Generally, to access features on an iPhone there is a 'slide to unlock' message that needs to be swiped near the bottom of the phone lock screen. This is still available during blocking mode with both technologies, so intuitively phone users will always swipe this to access their phone, which will always result in a 'tamper' while driving, with both blocking technologies. To access the override functions, a reportable phone tamper is first required, leading to a warning notification being displayed. This message then needs to be swiped to get to the override functions. Although this was explained at the information sessions, participants would not have been able to be practise this until a month later, during the blocking period, where many participants had issues as mentioned previously.

4.2 Effects on attitudes

Participants generally held negative attitudes to phone use while driving before the trial, with a large proportion recognising the risks of hand held phone calls, and the risks of sending and reading text messages while driving. This could be due to their recruitment from a corporation with a strong safety culture, including a strong driving safety culture. A lower proportion of participants viewed hands free phone use as dangerous, which could be related to it being legal. The technology trialled in this study permitted hands free phone use at the request of the corporation but only so people were aware when their phone was ringing, so that they could pull over and answer it. The corporation's phone policy does not permit hands free phone use while driving.

One outcome of this clear recognition of the dangers of phone use while driving was that it was difficult to detect any increase in the recognition of risk following the trial. The only items concerned with phone use attitudes which did demonstrate an effect were those related to phone blocking technology being a 'good idea': support for this idea dropped significantly following the trial, no doubt reflecting the negative experiences many participants had with the technologies.

In regard to other items enquiring about attitudes to phone blocking, there were indications that the trial had resulted in a more negative attitude to phone blocking technology as a viable method of reducing phone use while driving in an occupational setting. Following the trial, participants were more likely to indicate that phone blocking would negatively affect work and were less likely to think phone blocking would improve safety or be worth considering for their own vehicle. This was the case regardless of whether the participants had trialled Technology A or Technology B. Again, this demonstrates the effect of negative experiences with the phone blocking products assessed in the study.

4.3 Effects on behaviour

In keeping with the generally negative attitudes to phone use while driving, there were low levels of self-reported phone use even before the phone blocking trial had commenced. Around 90 percent of participants reported never or rarely sending a text message while driving. Despite the low baseline rate of phone use while driving, the phone blocking trial did result in reductions in this behaviour. There were increases during the phone blocking trial in the likelihood of participants 'rarely' or 'never' making or answering calls, or reading text messages. This was seen regardless of which technology was trialled. As those using Technology B would only get their phones blocked in work vehicles, it is

interesting to note an apparent effect on behaviour also when driving their own vehicles, suggesting the possibility of a transferability of the effect on behaviour into other contexts.

It should be noted that, while the purpose of this study was to examine the effectiveness and acceptability of mobile phone blocking technology among drivers, the two technologies also allow the monitoring of an organisation's mobile phone policy compliance through their respective web-portals. Organisations utilising either of these technologies can attempt to prevent mobile phone use by using the blocking capabilities of the technologies but can also monitor any non-compliance. Individuals can then be counselled if non-compliance is reported.

4.4 Limitations

The sample recruited for the study was based at an organisation with a strong safety culture in which phone use while driving was actively discouraged. Partway through the project development phase, SA Power Networks enacted a work health and safety directive banning all mobile phone use (including hands free) while driving on company time or driving a company vehicle. This is likely to have contributed to most participants having negative attitudes to phone use while driving and only rarely engaging in such activities, even before the trial. This would have made it difficult in this trial to detect a positive effect of phone blocking technology. Nonetheless, statistically significant changes in self-reported behaviour were detected.

Also, difficulties with obtaining sufficient units of hardware for Technology B meant that only a small sample was available to assess that product. However, the sample for Technology B was of sufficient size to demonstrate statistically significant differences to Technology A on a number of measures.

Another limitation is that Technology B required participants with access to their own fleet vehicle, rather than using pool vehicles, meaning that the participant groups assessing the two technologies were likely to be different. However, patterns of responses on the pre-trial questionnaire were very similar.

All the phone use data analysed in this study were self-reported by the participants in the pre- and post-questionnaires. An attempt was made to collect and analyse actual phone use data that was purportedly collected by the respective technology provider web-portals but the data were not available in a manner that was suitable for analysis.

Finally, it was easy to 'swipe off' the software for Technology A or disable the blocking by turning off locations services, and most participants did this at some stage during the trial. In fact, only one participant was found to have had the phone blocking software operating for all 22 days of the trial. CASR staff were aware of who had swiped off or otherwise disabled the software on their phone and would contact participants to remind them to re-activate it and encourage them not to swipe it off again. In total, only 22 participants had the software operating for 11 days or more, 40 people had the software operational for 1 to 10 days, and 14 people appear to have used Technology A for less than one day. This may partly explain why a large proportion of participants reported not even experiencing phone blocking with Technology A or that it did not worked reliably every time. Although this is problematic, it is also important to recognise that in a field trial such as this, one is interested in examining what people actually do, and it is apparent that many people will either deliberately or accidentally swipe off or disable the software and render it inactive, especially if there is no consequence for doing so.

4.5 Conclusions

The results of this trial suggest that phone blocking products may provide a useful method of changing mobile phone use behaviour while driving. However, the products, whether they are software only or software combined with hardware, need to improve to reach higher ratings of user acceptance and approval. A number of issues with the operation of the two technologies were identified in this trial, which will need to be addressed in order to support a recommendation for wider implementation or promotion of phone blocking as a countermeasure for phone use while driving.

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Appendix A – Pre-trial Mobile Phone Blocking Survey

Survey Start: Demographics

1. Participant ID: _____
2. Age: _____ years
3. Sex: Male Female
4. Work area: _____

General mobile phone use while driving

To what extent do you agree with the following statements?

(Strongly Agree, Agree, Somewhat Agree, Neutral, Somewhat Disagree, Disagree, Strongly Disagree)

5. It would be dangerous for me to have a “hands free” phone conversation on my mobile phone while driving.
6. It would be dangerous for me to have a “hand held” phone conversation on my mobile phone while driving.
7. It would be dangerous for me to send a text message while driving.
8. It would be dangerous for me to read a text message sent to me while driving.
9. I think it is a good idea to use software or hardware to prevent phone use while driving a work vehicle.
10. It is dangerous for a typical driver to make a “hands free” phone call on their mobile phone while driving.
11. It is dangerous for a typical driver to make a “hand held” phone call on their mobile phone while driving.
12. It is dangerous for a typical driver to send a text message while driving.
13. I think it would be a good idea for a typical driver to use software or hardware to prevent phone use while driving.

Your mobile phone use while driving

How often do you do the following?

(Every time, Usually, Frequently, Sometimes, Occasionally, Rarely, Never)

14. How often do you make a phone call while driving a work vehicle?
15. How often do you make a phone call while driving your own vehicle for non-work purposes?
16. How often do you answer a phone call while driving a work vehicle?

17. How often do you answer a phone call while driving your own vehicle for non-work purposes?
18. How often do you send a text message while driving a work vehicle?
19. How often do you send a text message while driving your own vehicle for non-work purposes?
20. How often do you receive and read a text message while driving a work vehicle?
21. How often do you receive and read a text message while driving your own vehicle for non-work purposes?

Mobile phone blocking technology and driving

To what extent do you agree with the following statements?

(Strongly Agree, Agree, Somewhat Agree, Neutral, Somewhat Disagree, Disagree, Strongly Disagree)

22. I think mobile phone blocking technology would interfere with my work.
23. I think mobile phone blocking technology would make me a safer driver.
24. I think that some work tasks that I have to perform will be more difficult if technology is used to block my mobile phone when I am driving a work vehicle.
25. I think that not being able to communicate with others using my mobile phone while driving will make work more stressful.
26. I think that important communication with my work colleagues will be prevented or made more difficult by mobile phone blocking technology used when I drive a work vehicle.
27. I think using phone blocking technology to prevent my personal phone from operating when I am driving my own vehicle would make me a safer driver.
28. I would consider using phone blocking technology to prevent my personal phone from operating when I am driving my own vehicle.

Are there any other comments you would like to make regarding mobile phone use while driving?

(Open ended response)

Appendix B – Post-trial Mobile Phone Blocking Survey

Survey Start: Demographics

1. Participant ID: _____
2. Age: _____ years
3. Sex: Male Female
4. Work area: _____

General mobile phone use while driving

To what extent do you agree with the following statements?

(Strongly Agree, Agree, Somewhat Agree, Neutral, Somewhat Disagree, Disagree, Strongly Disagree)

5. It would be dangerous for me to have a “hands free” phone conversation on my mobile phone while driving.
6. It would be dangerous for me to have a “hand held” phone conversation on my mobile phone while driving.
7. It would be dangerous for me to send a text message while driving.
8. It would be dangerous for me to read a text message sent to me while driving.
9. I think it is a good idea to use software or hardware to prevent phone use while driving a work vehicle.
10. It is dangerous for a typical driver to make a “hands free” phone call on their mobile phone while driving.
11. It is dangerous for a typical driver to make a “hand held” phone call on their mobile phone while driving.
12. It is dangerous for a typical driver to send a text message while driving.
13. I think it would be a good idea for a typical driver to use software or hardware to prevent phone use while driving.

Your mobile phone use during the phone blocking trial

For this set of questions, think about the period of time when you were participating in the phone blocking trial.

(Every time, Usually, Frequently, Sometimes, Occasionally, Rarely, Never)

14. How often during the trial did you make a phone call while driving a work vehicle?

15. How often during the trial did you make a phone call while driving your own vehicle for non-work purposes?
16. How often during the trial did you answer a phone call while driving a work vehicle?
17. How often during the trial did you answer a phone call while driving your own vehicle for non-work purposes?
18. How often during the trial did you send a text message while driving a work vehicle?
19. How often during the trial did you send a text message while driving your own vehicle for non-work purposes?
20. How often during the trial did you receive and read a text message while driving a work vehicle?
21. How often during the trial did you receive and read a text message while driving your own vehicle for non-work purposes?

Blocking Technology

22. Which blocking technology did you trial?

    Technology A (App only) Technology B (App + Hardware)

23. Did you ever experience your phone being blocked by the technology you trialled?

    Yes No

24. Did the technology that you trialled work reliably?

    Rarely Some of the time Most of the time Every time

25. Did you ever try and test the blocking technology just to see if it worked?
    - As a driver: Never Once A few times
    - As a passenger: Never Once A few times

26. How often was your phone connected to a hands free device while driving?

    Never Sometimes Always

27. Were you aware that calls through hands free devices would NOT be blocked?

    Yes No Unsure

Your experience with the blocking technology

To what extent do you agree with the following statements?

(Strongly Agree, Agree, Somewhat Agree, Neutral, Somewhat Disagree, Disagree, Strongly Disagree)

28. The phone blocking technology I experienced during the trial interfered with my work.
29. The phone blocking technology I experienced during the trial made me a safer driver.
30. Some work tasks I had to perform were more difficult because of the phone blocking technology I experienced during the trial.
31. Not being able to communicate with others using my mobile phone while driving made work more stressful.
32. Important communication with my work colleagues was prevented or made more difficult by the phone blocking technology I experienced during the trial.
33. I found the phone blocking technology worked in the way it was supposed to.
34. I was able to override the phone blocking technology when I needed to.
35. I was able to use my mobile phone when travelling in a work vehicle as a passenger.
36. I was prevented from using my mobile phone by the technology when I should not have been.
37. I was satisfied with the performance of the phone blocking technology.
38. The phone blocking technology depleted my phone battery to a degree that caused me inconvenience.
39. I think using phone blocking technology to prevent my personal phone from operating when I am driving my own vehicle would make me a safer driver.
40. I would consider using phone blocking technology to prevent my personal phone from operating when I am driving my own vehicle.

Using the blocking technology

41. How often did you use the passenger override feature?
    - As a driver: Never Once A few times Frequently
    - As a passenger: Never Once A few times Frequently
    - Another passenger in the vehicle used it: Never Once A few times Frequently
42. Did you have any problems accessing your phone after a journey ended?

    Never Once A few times Frequently

43. Did you ever close or swipe-off the phone blocking app during the trial?

    Never Once A few times Frequently

44. If you did close or swipe-off the app, what was the reason?

    Didn't want phone to be blocked Conserve battery life Accidentally

    Due to habit Other (please specify)…

45. If you did close or swipe off the app, did you realise the app would not work?

    Yes No

Recommending and rating the blocking technology

46. Would you recommend the specific phone blocking technology you trialled, as a way to prevent drivers from using mobile phones while driving?

    Yes No

47. Why would you recommend or not recommend this technology as a way to prevent drivers from using mobile phones while driving?

    (Open ended response)

48. How would you rate the mobile phone blocking technology you trialled, based on your overall experience with it?

    10. Excellent 9. 8. 7. 6. 5. 4. 3. 2. 1.

    0. Very poor

Final Comments

49. Was there anything about the way the mobile phone blocking technology worked that you found troublesome or annoying?

    (Open ended response)

50. Are there any improvements you think that could be made to this technology? Please specify.

    (Open ended response)

51. Do you have any other comments you would like to make, regarding the trial or technology you trialled?

    (Open ended response)

Appendix C – Table 3.1 with supplementary data (responses to the full seven-point Likert scale)

Table 3.1
Participant experiences of the two phone blocking technologies
(for *n*=76 participants who trialled Technology A and *n*=28 who trialled Technology B)

	Strongly Agree %	Agree %	Somewhat Agree %	Neutral %	Somewhat Disagree %	Disagree %	Strongly Disagree %
Worked as it was supposed to*							
Technology A	9.3	24.0	17.3	10.7	14.7	18.7	5.3
Technology B	35.7	42.9	10.7	0.0	7.1	3.6	0.0
Able to override							
Technology A	4.0	13.3	13.3	36.0	8.0	14.7	10.7
Technology B	3.6	14.3	3.6	35.7	14.3	10.7	17.9
Able to use phone as a passenger							
Technology A	5.3	34.7	5.3	36.0	2.7	13.3	2.7
Technology B	10.7	10.7	3.6	64.3	0.0	7.1	3.6
Prevented phone use when it should not have							
Technology A	14.7	28.0	16.0	5.3	1.3	17.3	17.3
Technology B	7.4	14.8	3.7	7.4	7.4	25.9	33.3
Satisfied with performance of the technology							
Technology A	6.8	23.0	17.6	10.8	16.2	13.5	12.2
Technology B	11.1	55.6	7.4	3.7	11.1	3.7	7.4
Depleted the phone battery*							
Technology A	18.9	16.2	20.3	16.2	5.4	14.9	8.1
Technology B	67.9	17.9	10.7	0.0	3.6	0.0	0.0

* p value for chi square test <.05

Appendix D – Table 3.2 with supplementary data (responses to the full seven-point Likert scale)

Table 3.2
Participants' responses to questions concerning the use of Technology A (*n*=76) and B (*n*=28)

	Never %	Once %	A few times %	Frequently %
How often did you use the passenger override feature as a driver?				
Technology A	86.8	7.9	5.3	0.0
Technology B	89.3	3.6	7.1	0.0
How often did you use the passenger override feature as a passenger?				
Technology A	64.4	9.6	23.3	2.7
Technology B	78.6	14.3	7.1	0.0
How often did another passenger use the passenger override feature?				
Technology A	75.0	4.2	19.4	1.4
Technology B	75.0	14.3	10.7	0.0
Did you have any problems accessing your phone after a journey ended?				
Technology A	40.8	10.5	28.9	19.7
Technology B	50.0	10.7	21.4	17.9
Did you ever close or swipe-off the phone blocking app during the trial?				
Technology A	35.5	19.7	40.8	3.9
Technology B	35.7	28.6	35.7	0.0

* p value for chi square test <.05

Appendix E – Table 3.3 with supplementary data (responses to the full seven-point Likert scale)

Table 3.3
Attitudes to phone use while driving, for participants who trialled Technology A (*n*=76) and those who trialled Technology B (*n*=28)

	Strongly Agree %	Agree %	Somewhat Agree %	Neutral %	Somewhat Disagree %	Disagree %	Strongly Disagree %
Dangerous for me to make hands free call when driving							
Technology A - Pre-trial	12.0	21.3	24.0	10.7	10.7	17.3	4.0
Post-trial	7.9	22.4	21.1	11.8	18.4	13.2	5.3
Technology B - Pre-trial	10.7	17.9	35.7	7.1	21.4	3.6	3.6
Post-trial	10.7	17.9	35.7	10.7	17.9	3.6	3.6
Dangerous for me to make hand held call when driving							
Technology A - Pre-trial	66.7	24.0	4.0	0.0	1.3	4.0	0.0
Post-trial	69.7	21.1	5.3	0.0	0.0	2.6	1.3
Technology B - Pre-trial	71.4	17.9	10.7	0.0	0.0	0.0	0.0
Post-trial	71.4	21.4	7.1	0.0	0.0	0.0	0.0
Dangerous for me to send a text when driving							
Technology A - Pre-trial	86.7	10.7	2.7	0.0	0.0	0.0	0.0
Post-trial	93.4	5.3	1.3	0.0	0.0	0.0	0.0
Technology B - Pre-trial	85.7	14.3	0.0	0.0	0.0	0.0	0.0
Post-trial	89.3	10.7	0.0	0.0	0.0	0.0	0.0
Dangerous for me to read a text when driving							
Technology A - Pre-trial	77.3	18.7	2.7	0.0	1.3	0.0	0.0
Post-trial	80.3	10.5	7.9	0.0	0.0	1.3	0.0
Technology B - Pre-trial	75.0	14.3	10.7	0.0	0.0	0.0	0.0
Post-trial	78.6	21.4	0.0	0.0	0.0	0.0	0.0
Good idea to use phone blocking when driving a work vehicle							
Technology A - Pre-trial	22.4	35.5	13.2	14.5	9.2	3.9	1.3
Post-trial	19.7	23.7	14.5	11.8	9.2	15.8	5.3
Technology B - Pre-trial	25.0	28.6	28.6	7.1	7.1	3.6	0.0
Post-trial	25.0	32.1	25.0	3.6	7.1	3.6	3.6
Dangerous for typical driver to make hands free call when driving							
Technology A - Pre-trial	24.0	21.3	26.7	8.0	9.3	10.7	0.0
Post-trial	22.4	27.6	14.5	10.5	14.5	7.9	2.6
Technology B - Pre-trial	14.3	25.0	21.4	10.7	28.6	0.0	0.0
Post-trial	21.4	28.6	21.4	10.7	10.7	3.6	3.6
Dangerous for typical driver to make hand held call when driving							
Technology A - Pre-trial	64.5	30.3	1.3	1.3	1.3	1.3	0.0
Post-trial	77.6	18.4	1.3	0.0	0.0	2.6	0.0
Technology B - Pre-trial	70.4	18.5	7.4	0.0	3.7	0.0	0.0
Post-trial	85.7	14.3	0.0	0.0	0.0	0.0	0.0
Dangerous for typical driver to send a text when driving							
Technology A - Pre-trial	85.5	14.5	0.0	0.0	0.0	0.0	0.0
Post-trial	92.1	6.6	1.3	0.0	0.0	0.0	0.0
Technology B - Pre-trial	89.3	10.7	0.0	0.0	0.0	0.0	0.0
Post-trial	92.9	7.1	0.0	0.0	0.0	0.0	0.0
Good idea for a typical driver to use phone blocking when driving							
Technology A - Pre-trial	34.2	27.6	15.8	13.2	3.9	3.9	1.3
Post-trial	22.4	23.7	17.1	7.9	7.9	13.2	7.9
Technology B - Pre-trial	28.6	32.1	25.0	14.3	0.0	0.0	0.0
Post-trial	35.7	25.0	21.4	14.3	0.0	0.0	3.6

Appendix F – Table 3.4 with supplementary data (responses to the full seven-point Likert scale)

Table 3.4
Attitudes to phone blocking technology, for participants who trialled Technology A (*n*=76) and those who trialled Technology B (*n*=28)

	Strongly Agree %	Agree %	Somewhat Agree %	Neutral %	Somewhat Disagree %	Disagree %	Strongly Disagree %
Phone blocking would interfere with work							
Technology A - Pre-trial	5.3	10.5	14.5	26.3	3.9	27.6	11.8
Post-trial	11.8	21.1	17.1	17.1	3.9	17.1	11.8
Technology B - Pre-trial	3.6	7.1	10.7	14.3	7.1	46.4	10.7
Post-trial	14.3	7.1	21.4	7.1	0.0	21.4	28.6
Phone blocking would make you a safer driver in your work vehicle							
Technology A - Pre-trial	13.2	26.3	22.4	17.1	11.8	7.9	1.3
Post-trial	6.6	14.5	22.4	17.1	9.2	18.4	11.8
Technology B - Pre-trial	10.7	32.1	21.4	28.6	0.0	7.1	0.0
Post-trial	10.7	21.4	35.7	10.7	3.6	3.6	14.3
Phone blocking would make work tasks more difficult							
Technology A - Pre-trial	2.7	21.6	13.5	20.3	6.8	25.7	9.5
Post-trial	10.7	28.0	9.3	16.0	5.3	20.0	10.7
Technology B - Pre-trial	0.0	10.7	17.9	3.6	14.3	35.7	17.9
Post-trial	7.1	10.7	17.9	17.9	0.0	17.9	28.6
Phone blocking would make work more stressful							
Technology A - Pre-trial	2.7	6.7	16.0	17.3	6.7	40.0	10.7
Post-trial	9.3	13.3	14.7	12.0	2.7	29.3	18.7
Technology B - Pre-trial	0.0	7.1	21.4	3.6	10.7	35.7	21.4
Post-trial	0.0	7.1	35.7	0.0	7.1	28.6	21.4
Phone blocking would prevent important communication							
Technology A - Pre-trial	6.6	13.2	18.4	6.6	6.6	36.8	11.8
Post-trial	12.0	16.0	17.3	9.3	4.0	29.3	12.0
Technology B - Pre-trial	3.6	10.7	21.4	3.6	14.3	28.6	17.9
Post-trial	7.1	25.0	14.3	10.7	0.0	21.4	21.4
Phone blocking would make you a safer driver in your personal vehicle							
Technology A - Pre-trial	12.2	29.7	23.0	17.6	5.4	10.8	1.4
Post-trial	8.0	13.3	22.7	22.7	8.0	10.7	14.7
Technology B - Pre-trial	7.4	37.0	11.1	22.2	7.4	11.1	3.7
Post-trial	17.9	17.9	25.0	17.9	3.6	3.6	14.3
Would consider phone blocking in my own vehicle							
Technology A - Pre-trial	9.5	23.0	18.9	20.3	8.1	14.9	5.4
Post-trial	6.7	13.3	14.7	17.3	8.0	17.3	22.7
Technology B - Pre-trial	11.1	29.6	11.1	25.9	14.8	3.7	3.7
Post-trial	17.9	17.9	14.3	10.7	10.7	10.7	17.9

Appendix G – Table 3.5 with supplementary data (responses to the full seven-point Likert scale)

Table 3.5
Self-reported behaviour in regard to phone use while driving, for participants who trialled Technology A (*n*=76) and those who trialled Technology B (*n*=28)

	Every time %	Usually %	Frequently %	Sometimes %	Occasionally %	Rarely %	Never %
Frequency make phone call in work vehicle							
Technology A - Pre-trial	0.0	2.6	5.3	7.9	7.9	21.1	55.3
Post-trial	1.3	0.0	0.0	4.0	6.7	8.0	80.0
Technology B - Pre-trial	0.0	10.7	7.1	14.3	14.3	17.9	35.7
Post-trial	0.0	3.6	0.0	3.6	3.6	10.7	78.6
Frequency make phone call in own vehicle							
Technology A - Pre-trial	1.3	10.7	5.3	10.7	12.0	32.0	28.0
Post-trial	0.0	3.9	6.6	5.3	9.2	14.5	60.5
Technology B - Pre-trial	0.0	7.1	10.7	25.0	14.3	21.4	21.4
Post-trial	0.0	3.6	3.6	3.6	10.7	21.4	57.1
Frequency answering phone in work vehicle							
Technology A - Pre-trial	2.7	8.0	5.3	9.3	4.0	17.3	53.3
Post-trial	0.0	1.3	2.6	7.9	5.3	19.7	63.2
Technology B - Pre-trial	0.0	7.1	7.1	25.0	17.9	7.1	35.7
Post-trial	3.6	0.0	3.6	3.6	0.0	21.4	67.9
Frequency answering phone in own vehicle							
Technology A - Pre-trial	6.6	11.8	6.6	13.2	13.2	23.7	25.0
Post-trial	2.6	3.9	7.9	3.9	13.2	17.1	51.3
Technology B - Pre-trial	3.6	3.6	10.7	35.7	25.0	10.7	10.7
Post-trial	7.1	0.0	3.6	3.6	17.9	21.4	46.4
Frequency send text in work vehicle							
Technology A - Pre-trial	0.0	0.0	1.3	1.3	0.0	11.8	85.5
Post-trial	0.0	0.0	0.0	0.0	0.0	3.9	96.1
Technology B - Pre-trial	0.0	0.0	0.0	0.0	10.7	17.9	71.4
Post-trial	0.0	0.0	0.0	0.0	7.1	0.0	92.9
Frequency send text in own vehicle							
Technology A - Pre-trial	0.0	1.3	1.3	3.9	3.9	14.5	75.0
Post-trial	0.0	0.0	1.3	2.6	0.0	2.6	93.4
Technology B - Pre-trial	0.0	0.0	0.0	0.0	14.3	17.9	67.9
Post-trial	0.0	0.0	0.0	0.0	7.1	0.0	92.9
Frequency read text in work vehicle							
Technology A - Pre-trial	0.0	0.0	1.3	2.6	7.9	22.4	65.8
Post-trial	0.0	0.0	0.0	2.7	1.3	10.7	85.3
Technology B - Pre-trial	0.0	7.1	3.6	7.1	7.1	17.9	57.1
Post-trial	0.0	0.0	3.6	0.0	7.1	14.3	75.0
Frequency read text in own vehicle							
Technology A - Pre-trial	1.3	3.9	1.3	5.3	15.8	28.9	43.4
Post-trial	0.0	1.3	1.3	1.3	6.6	10.5	78.9
Technology B - Pre-trial	0.0	7.1	3.6	14.3	7.1	28.6	39.3
Post-trial	0.0	0.0	3.6	3.6	3.6	35.7	53.6

Appendix H – Reasons why the participants would recommend or not recommend the technology they trialled as a way to prevent drivers from using mobile phones while driving

The participants were asked in the post-trial to specify why they would recommend or not recommend the technology that they trialled, as a way to prevent drivers from using mobile phones while driving. The content of the responses from the participants have not been edited, however, any reference to the commercial names of the specific technologies used by participants have been changed. The responses from the participants included:

Participants who trialled Technology A (App only)

Would recommend

- It just removes the automatic distraction of having the phone there and being able to use it.
- I think it would be a good way to monitor drivers that can't help but to use their phone, overall I believe drivers are able to leave the phone alone. It could be a good app for law enforcement of repeat offenders.
- Prevents the distraction of a ringing phone and concentration was not disturbed, as long as the phone was put away and not in a pocket or in sight.
- Driving is the highest risk task I perform at work.
- It's a good start to stop people using phones while driving.
- Recommend as it makes you really think about answering a call or reading/sending a message while driving (i.e. to make driving safer).
- I recommend this technology should be mandatory on all mobile phone devices to prevent communication whilst mobile in any vehicle.
- I would recommend it. All about safety, whatever works to keep the fatalities down.
- No reason to talk on phone while driving. Just drive.
- Due to the fact that we have a no use policy while driving is good enough for me but other Tech savvy people may be unable to resist? I find it helpful if it is safe to pull over do that or just stop the call and ring back when convenient.
- For people under 25 (i.e. people that didn't live in the pre-smart phone era).
- Battery life was a major problem. New phone going from 100% to dead flat in 10 hours.
- Would make the user aware of what they are doing when they go to use their phone while driving. Could help break the habit.
- Good drivers just drive.
- Safety.
- It makes driving safer.

- Much safer to block use of phone and avoid driver distraction.
- Only if the time between stopping and being able to use the phone was shortened as it seemed to take a lot of time to work out I wasn't driving.
- I think that using a mobile phone while driving is an unsafe action.
- It's a good idea.
- To make one a better driver.
- It is the only way to drive a vehicle - we need to reduce distraction while driving.
- Brings it to front of mind.
- Lots of people have trouble just driving.
- It could change some drivers' bad habits to an extent.
- Manly to be used by people who don't have hands free and can't not talk when driving.
- Fear factor of being in trouble with organisation.
- Forces people to be safer.
- Safer drivers on the roads - drivers should only drive.
- With further development to eliminate problems with passenger access it would be of benefit.
- Would recommend. Battery drain was evident, but was better after the update. I didn't think about the app until I needed to use the phone during or at the end of the drive as a passenger and get blocked.
- The app works for the purpose that SAPN trialled, it is not fool proof - it can be turned off. If the whole unit is installed then that may work.
- Can be overridden at any time. As a driver must not be doing any texting or reading text while driving. Receiving call would be the only thing that I do but I check to see who it is before I answer and only answer if I know needs attention or else I leave to go to message bank.
- Would recommend this technology in work vehicles if it was company policy. Should be an option in private vehicle but not compulsory.
- If this is what a company or person wanted but its not for me.
- Good drivers just drive, all phones come with message bank or it can be set up. Get to your destination and check for messages
- Battery usage needs fixing as does end of journey as a call comes in and you wish to pull over to take it you lose it by time the software exits.
- Greater chance of limiting distraction and promoting concentration on driving

Would not recommend

- There are times when it is important both within work and out side of work that people are contactable. The additional frustration of not being able to accept calls and added risk when re entering traffic after pulling over to take calls levels out the risk of taking a call in the right circumstances.
- It was disruptive to the phone in general and a total pain in the neck. It rarely blocked calls in the car and seemed to not ring on blue tooth but still ring on the handset. It frequently blocked my phone whilst in my lounge room at home.
- People that use phone while driving would still but be distracted more as it is not so easy to answer phone.
- Hinders work performance. Phone is blocked for some time after the car has stopped driving resulting in loss of time waiting for the phone to function again.
- I don't think we need an app to tell us to do this. We have a company directive saying we cannot do this and as well it is the law.
- The phone was blocked when I was walking! 5 mins after the journey end. I entered the passcode to access my phone and the fleet saver did not allow me to get past the desktop. Very annoying. I like the idea of software blocking but it has to be reliable. If I had stopped my vehicle to help someone in an emergency and in the confusion I could not use the phone...well it could lead to a bad outcome.
- Inability to access phone when pulled over after driving to answer or make a call.
- It should be a behavioural control. The app should not be the primary control.
- Communications at work are essential. This limits our ability to communicate.
- Didn't appear to work.
- It was too unreliable i.e. Blocked calls after I had stopped and parked car (engine still running).
- Only allow hands free Bluetooth call receiving.
- It’s very difficult to use your phone as a passenger or while on public transport.
- It was difficult to know when it was active. For the first week it didn't work at all. Then it worked for a week or so. Then it didn't. I was never sure whether it was on or off.
- It is not reliable. It lets you answer the phone when it shouldn't and won't even let you unlock your phone after a journey.
- App does not seem to be reliable at this stage, did not always block incoming calls while driving and blocked calls for more than half an hour after stopped driving. Reduced battery life.
- Not really needed when have Bluetooth hands free.
- I didn't use my work phone whilst in a car, so unable to comment.

- Better technology required before I would recommend this.
- Not recommend, as I got frustrated because it blocked when walking and ended up swiping it off.
- I don't believe we should rely on a technology solution to overcome people's behaviours. People will always find a way to bypass the technology solution.
- App is unreliable (sound sometimes doesn't return when stopped), app keeps giving annoying notifications (with no way to stop them), blocking continues too long after stopping, app glitched more than once and prevented me from unlocking the phone (I have a video you can see if required), significant battery consumption. Even with improvements and fixing these issues I wouldn't use this app. I spent money to install Bluetooth in all my private cars and I believe that is safe enough to use. If I feel I need to concentrate I will end the call.
- All my vehicles at home and work vehicle have hands free mobile phone features so I do not need or want phone blocking technology.
- The use or misuse of the technology is more of a distraction than the call at most times.
- I have hands free devices in all vehicles that I used. From your questionnaire I now know that the app does not function with hands free devices connected. The app never functioned for me. I just ignored all calls and managed my own access to phone whilst driving.
- Too many flaws in it
- The end of journey delay (2 min +) for the phone to work was very annoying. If this was corrected I may change my opinion.
- Needs a few adjustments, phone would not work for minutes after travelling. Would not allow phone to be unlocked to allow access as a passenger.
- Became frustrating accessing my phone at times once the vehicle had stopped.

Participants who trialled Technology B (App + Hardware)

Would recommend

- I liked that the technology advised the caller that I was driving and unable to answer the phone. I would have preferred to not be advised of an incoming call until I had stopped driving. Knowing I had received a call distracted me from concentrating on driving and made me anxious to pull over. Then waiting for the technology to allow the phone to operate was frustrating.
- Simple to use.
- For habitual drivers who text or make or receive calls then intervention is a quicker way to change behaviours.
- It worked really well for incoming calls, the phone would not even ring so there was no way you could answer it.
- Only when driver does not have self-discipline to turn phone off when driving.

- Although quite disciplined in not using phone whilst driving, I did at times reach or consider looking. For those undisciplined it's a great shift to change habits.
- Safety.
- The blocking technology let people know that I was driving were the app did not.
- Recommended if reliable because it was quite effective. Problem was that it didn't always operate consistently and this became a bit of a distraction.
- It was simple and effective. However, the lack of battery life was quite extreme and very inconvenient.
- For safety of the incumbent and other road users.
- It's good because in most cases, it doesn't constantly ring and which distract you as you wonder who it could and tempted to just look at the phone.
- It takes a little while to get use to it, however it's better to be safe than sorry.
- It is always safe for drivers not using mobile phone device while driving.
- I don't think drivers can be relied on to not answer or use the phone. Blocking technology takes away the temptation.
- Very effective device providing you have the patience to charge your phone regularly as it does draw down on the charge quickly.
- Well it works, but unfortunately I enjoy talking to others especially on long drives, I feel safer and more alert when frequently communicating on longer drives. I disliked phone blocking, it took away a good culture, I felt like this is over the top and driving whilst 'talking is a crime, when it's purely engaging in conversation.

Would not recommend

- This phone blocking technology works very well. The two main issues I had was battery life wouldn't last through a shift and the 30-second delay is too long. If someone rings I should be able to pull over if safe to do so and take the call.
- Education is a better option as those that want to will bypass anyway.
- If the driver is already in a fire danger zone and the fire danger level changed during that time, there is no way for others to communicate and advice the driver of this change, so it becomes a safety issue.
- The battery depletion problem is a significant issue that needs to be addressed.
- Not having access to other workers during the fires left me in vulnerable situation and I felt unsafe.
- Would be a good option if battery drain was less impacting and reliability of blocking / notifying caller of driving was more reliable.

- Not consistently reliable and unnecessarily drained battery life of the phone.
- I believe that this technology can cause additional stress to drivers because it places drivers in a position where, if an important phone call is received while driving their vehicle, they are placed under stress trying to find a suitable place to pull over and stop to answer or respond to the call.
- Battery drain. The phone would occasionally ring when it should have been blocked (reliability of the application).
- For my driver and vehicle type, and driving pattern/ distance - No. For others using 'front line' vehicles, and doing significant distance - Yes. This is a risk-based judgement only.

Appendix I – Things about the way the technology worked that the participants found troublesome or annoying

The participants were asked to specify anything about the way the mobile phone blocking technology worked that they found troublesome or annoying. The content of the responses from the participants have not been edited, however, any reference to the commercial names of the specific technologies used by participants have been changed. The responses from the participants included:

Participants who trialled Technology A (Technology A, App only)

- The unlocking feature was quite annoying and difficult to use at first. I was trying it as a passenger and it took me a bit to work out and I know that some of the other guys were having the same trouble because I was showing them how to unlock it.
- I found the drain on my phone battery annoying. Mostly when I was in the Pinery fire grounds. I also found while in the fire grounds while service was down the app found it hard to know when I was stable or driving.
- Unlocking the phone immediately after stopping would always ask for end of drive. Battery consumption.
- The time to realise a journey is over. When pulling over to take a call or make one as soon as the vehicle has stopped is too long.
- It interrupted every aspect of having the phone.
- Battery life.
- It stayed blocked for a period, used up battery.
- Just remember to start the app before moving off in the vehicle.
- Made me pull over to answer customers' calls which I feel is more dangerous to other road users.
- I found that the phone would block while I was sitting at my desk, (ie. the movement of picking my phone up triggered the blocking and I could only access my phone by conducting a reset of the phone).
- Hinders work performance. Phone is blocked for some time after the car has stopped driving resulting in loss of time waiting for the phone to function again.
- Could not tell if it was working or not.
- Yes sometimes I wanted to make a call before leaving or after arriving and I could not do it, car warming up or air conditioner on, car not in motion pulled over on roadside etc.
- Wouldn't let me unlock after turning phone back from flight mode & had to restart.
- Flattening battery.

- The phone was blocked when I was walking! 5 mins after the journey end. If I had stopped my vehicle to help someone in an emergency and in the confusion I could not use the phone...well it could lead to a bad outcome.
- Kept on blocking for a minute after the car stopped.
- Making a call after driving the phone was slow to respond. The trip computer (GPS) on my bike is better at detecting when I have stopped moving.
- Inability to use phone at completion of drive for several minutes.
- Time delay in unlocking the phone after having stopped driving.
- The time it took for the blocking to stop once not driving. It once block me from using the phone at 6.30am sitting at the kitchen table and not been driving at all.
- Battery drain.
- Need to work around it when not driving.
- It was too unreliable i.e. blocked calls after I had stopped and parked car (engine still running).
- It did not work.
- Did affect battery life.
- While on public transport or as a passenger you continually have to put the phone back into passenger mode.
- Not sure about the two icons at the bottom - 'Driver' and 'About'. The program blocked for quite a while after I had left the car. It didn't always work when I was driving and it worked once when I was at my desk. If I needed to make an emergency call, I wouldn't have known how as it wouldn't let me dial at all. Not sure how to select 'Passenger.'
- I had forgotten to ensure it was connected.
- It is not reliable. It lets you answer the phone when it shouldn't and won't even let you unlock your phone after a journey.
- Once I had stopped. Tried to make a call and it would not let me for approx. 30 seconds.
- Did not always block incoming calls while driving and blocked calls for more than half an hour after stopped driving. Reduced battery life.
- It didn't work.
- Sometimes the app wouldn't disengage when exiting the vehicle.
- Battery usage on long drives, driving from Bordertown to Adelaide 3 hrs battery went from full to flat.
- Could not switch it off.
- Phone stayed locked after travelling when stopped stationary.

- Difficulty allowing passenger access.
- I use hands free all the time so most calls still came through. However the Technology A app didn't allow my passenger(s) to override the software so couldn't dial manually or send txt messages. The app wouldn't let anyone log onto the phone to get the get to the override. You had to turn the phone off and disable the Technology A App so the passenger could use the phone.
- The delay after the getting out of the vehicle made it annoying.
- You had to walk some distance from the vehicle before the app would let you make a call.
- Delay after stopping was too long, particularly while scoping a job where I needed to drive for a bit, pull over, and check my phone frequently. Technology A also seemed to have issues while Google Maps was navigating at the same time. Some times the Technology A notification didn't appear on my phone lock screen after stopping so I couldn't unlock the phone. I had to reboot the phone and swipe Technology A off. Sound didn't return after stopping. Or sounds were not muted while driving.
- Yes after journeys had to reboot my phone so phone would work properly again. Phone had to be charged 2 times a day even with the battery saver app update downloaded. In passenger mode phone would only allow one call and then lock me out. So I had to use other people's phones as a passenger to make calls.
- Just the battery going flat quicker. When accidently removed the AP did not know for a while not on till looked at what had running in the background. Continually asking me to join a Wifi connection and I did not want to.
- Nothing in particular, just took a while to get used too it.
- It would still block my phone after having stopped. Also found anytime you were mobile it would work in a boat etc.
- Flattening the battery of the mobile very quickly.
- Inconsistent, never new if it was working, frequently logged itself out, long delays on return to normal.
- Battery life.
- Did not work with hands free devices connected.
- Everything.
- Getting out of the car and walking before the technology worked out I wasn't travelling in a car.
- End of journey delay is not acceptable.
- Did not allow access if you had pulled over or stopped for up to 5 minutes.
- Continued to keep the phone blocked on a number of occasions once I had exited the vehicle.

Participants who trialled Technology B (Technology B, App + Hardware)

- The 30-second time delay is very annoying. And not being able to glance at phone to see if I received another job or message or CFS alerts
- The drain on the battery & the time it took to allow the phone to be used.
- Battery life.
- Depleted battery, battery was flat in approx. 14 hours.
- Yes, but minor. After stopping the car (and turning off) the phone would not activate immediately. It would take a few goes which was only probably about 1 min but felt longer :-)
- Battery was depleted rapidly and a few comments from others about call quality. May or may not be related.
- Only the drain on battery life.
- Troublesome because it quickly drained my phone battery.
- Battery depletion only.
- It took too long after stopping the car to release the use of the phone.
- Battery drain.
- Time delay after turning engine off.
- Not reliable and unnecessarily drained battery life from the phone.
- Significantly reduced the battery life on the phone even when the phone was not being used in the vehicle.
- A little hard to make calls after stopping, lost connection & was difficult to re-join.
- Had trouble finding a suitable place to mount the unit because of visibility so it was left on the dash. Overall it operated well in terms of blocking however it let 2 or 3 phone calls through during the period and these felt like they became a greater distraction. I think that I was only notified audibly on one occasion that a call had been received. A number of people told me that they had received a text or voice message indicating that I was driving and would respond at the end of my journey.
- Reliability and battery consumption.
- The override wasn't overly reliable. Quite often had to access it 2 to 3 times before it allowed me to override. This was only after I had left the car.
- The drain on battery life was terrible, sometimes my phone went flat at crucial times.
- YES! 1. battery was being depleted way too quickly especially when you're driving for long distances. 2. Emails were blocked, which meant that even after you've finished driving the emails weren't actually on my phone but available on the server hence couldn't respond to urgent emails/approvals requests etc. 3. Passenger mode/ fast release were buggy, sometimes as a passenger it didn't even allow you to unlock your phone to select that mode.
- Unidentified numbers ring me cause me concerns during the Pinery Bushfire.

- The battery was draining continuously. That was the main irritant.
- The hands free did ring even though the call was eventually blocked.
- Continually having to charge the phone.
- I was annoyed and had to continually stop vehicle on long drives, which meant a 4hr drive turned into a whole day in a car. Far less productive being blocked.

Appendix J – Suggested improvements that could be made to the technology

The participants were asked to specify any improvements that they thought could be made to the technology. The content of the responses from the participants have not been edited, however, any reference to the commercial names of the specific technologies used by participants have been changed. The responses from the participants included:

Participants who trialled Technology A (Technology A, App only)

- I think it would be better if you could unlock your phone as normal but then go to a screen which you have the option of unlocking as a passenger.
- Better battery life is a must. Better operation in low phone signal areas.
- Reduce the time to realise a journey is over. The delay when pulling over to take a call or make one as soon as the vehicle has stopped is too long.
- I see no value in the technology.
- Training and delivery.
- It creates more problems than it cures.
- Nothing I can think of, other than if a driver really wants to override the technology it can be done simply by selecting passenger, which seems a little too convenient.
- Somehow ensure that the driver can't override the technology.
- I was happy with the trial. It did not effect my work at all.
- If any calls need automatic reply & register with blip.
- Reliability.
- The phone needs to know the difference between driving and walking or when stopped.
- Have it run in the background (user can not turn it off).
- Blocking of text messages both receiving & sending. Allow brief hands free answering to acknowledge call.
- Reduce time delay in unlocking the phone after having stopped driving.
- Lessen the time between stopping and blocking.
- Decrease battery drain.
- More reliability.
- Improve battery life.
- More user friendly whilst in passenger mode.

- Fix problems related to reliability, the difficulty to know when the technology was on or off and the time delay in unlocking the phone after the vehicle had stopped.
- Fix the reliability issues.
- Make application more reliable and maintain battery life.
- Better education.
- I updated to the second version to save battery life but this made the app not work properly.
- Improve the passenger override functionality.
- As soon as the vehicle is turned off, it should allow you to use your phone.
- Stop notifying me about wifi every few minutes, I understand that battery consumption may be reduced with WIFI on, but wifi seems to use more battery than having Technology A on without wifi. Give me an option to acknowledge the notification and stop telling me the same thing! Emergency number in Technology A instructions are 911. That's not correct for most countries in the world. Spelling and grammar errors in various places in the program. Shorten the stopping delay to 30 sec or so. Sounds do not return after stopping the car. I had to flick the mute switch to bring sound back many times.
- Fix issues related to having to restart phone after a journey so that it works properly, having to recharge the phone twice daily and only being able to make one call in passenger mode and then being locked out.
- The phone should be able to be used straight away when the vehicle is stopped.
- Improve battery life, the technology uses too much.
- App needs work for reliability.
- Block calls when connected to hands free devices.
- Make the phone work when walking.
- Battery life.
- If I swipe to unlock the phone two or three times within 20~30 seconds then obviously want access to the phone and the app should deactivate. The hard time out is a weakness in the app.
- Text specific blocking especially sending text. Some of the other parts could be relaxed. Not being able to access even hands free.
- Ensure the app unblocks the phone once finished driving. Ensure battery life is improved on.

Participants who trialled Technology B (Technology B, App + Hardware)

- It works very well at stopping calls and preventing use of phone while driving. If there was a 5 second delay I could pull over to take the call if safe to do so. I was a passenger for some of the trial. It should be easier to disable call blocking.

- The hardware installed in the vehicle should determine when the vehicle is being driven not the location service on the phone, this may save battery life. I would rather not be advised of a call until I had stopped driving. This will prevent me from worrying about the call I have missed rather than concentrating on driving.
- Improve battery depletion.
- Block call via blue tooth if u want to be effective as most cars are no blue tooth equipped.
- Fix the battery problem.
- Not sure but important calls from our control room need a way to be passed through.
- Ability to set a auto message as soon as connected to Bluetooth blocking device notifying caller of driving and to leave message.
- Reduce the time delay after turning engine off.
- Fix issues related to reliability and draining battery life from phone.
- The app needs to go into sleep mode when it is not required.
- Faster to make call once you stop.
- The technology is good but it needs to operate consistently. Was a bit frustrating (but understandable) that you would have to wait a while when you had completed your journey before you could connect normally. No big deal though.
- It didn't appear to block the call when I had the phone charging in the glove box.
- Yes, decrease the drain on battery life.
- Fix issues related to depletion of the mobile phone battery, blocking of emails and inability to unlock the phone for passenger mode.
- Reduce battery usage/drain.
- If the battery were not drained continuously, it would be helpful.
- The blocking technology should be enhanced so you cannot use the phone while the engine is on. It is still tempting to use the phone while waiting at traffic lights etc. It would also be useful for the technology to block out all sounds from the phone.
- None other than improving the drain on the phone's battery. No text messages were being automatically sent to those who were sending me messages when I was driving.
- I don't support the no calls when driving policy.

Appendix K – Other comments regarding the trial or the technology

The participants were asked to specify any other comments that they wanted to make regarding the trial or the particular technology they trialled. The content of the comments from the participants have not been edited, however, any reference to the commercial names of the specific technologies used by participants have been changed. Their comments included:

Participants who trialled Technology A (Technology A, App only)

- As I am an apprentice I didn't get a lot of chance to actually use the features of the app as such but mainly gave it a go for the passenger side of things. Once I worked out how to over ride it seemed ok.
- Some of the comments reflect on a no calls policy (can't receive a call) and not the trail of the technology. A verbal message of "is it safe to take this call" rather than all the calls being blocked.
- Glad its over
- I feel hands free are safe to use
- Great idea/concept as I highly regard making the roads safer and this is one step in the right direction, it would be great for all new cars to have inbuilt blocking technology as standard.
- no need as company policy = no use while driving anyway!
- I don't think we need an app to tell us what to do. These apps are making morons out of us. We have a company directive that we do not use our hands free while driving and told the reasons why this is so and that makes sense. So common sense should prevail.
- Battery depletion was much worse during trail always needing recharge.
- SAPN instruction is to not use phones in SAPN vehicles so I would not use anyway. Had problems unblocking after vehicle stopped.
- I like the idea of software blocking but it has to be reliable and easily over-ridden when necessary.
- Inconsistent way device operated caused frustration.
- It use a lot of battery the phone had to be on the charger all the time when at my desk.
- The battery appeared to lose its charge quicker during the trial.
- Good to trial.
- I believe the trial may have put people at risk, when the phone rang you started looking for a place to pull over so distracted more than if you had taken the call. When the call was completed you then had to re-enter the line of traffic this again increased the risk.
- The frustration I experienced while using it in passenger mode eventually resulted in me deleting the app from my phone
- Great idea - we should proceed with ensuring all mobile phones have an app installed.

- The threat of being exposed alone is enough to change behaviour. For me it didn't really matter whether I was using the technology effectively as knowing that you could be caught is fearful. However I disagree with Bluetooth/hands free technology being off limits as this is an important part of life now and for people like me who spend two hours a day travelling to and from work as well as trips between worksites during the day, being able to make and receive hands free calls is imperative for safety (e.g elderly parents and children contact and productivity - being able to achieve multiple tasks during unproductive driving time. Staying in touch with friends and family is a very important part of health, well being and work life balance. Even if the technology was mandated in the organisation it should not be mandated during personal time.
- Thanks for letting me have my say.
- This is fine for vehicles that do not have hands free options. I would not use this app at all in cases where hands free vehicles are in use. As all modern cars are coming with hands free as standard I would not use this app.
- It may make it a bit safer but less productive as an operator/contractor.
- We have a work policy that states mobiles are not to be used when driving. This was being followed before, during & after the trial regardless of what blocking technology was placed on handset.
- Great initiative.
- Other than the time out and battery issues, all was OK.
- Good initiative. Blocking sending text as a set up in the phone should be mandatory.

Participants who trialled Technology B (Technology B, App + Hardware)

- I would have been less negative with this technology if it was just a normal work month. I usually get maybe six calls a day. And the computer usually works fine. During the bushfire restoration period the phone calls and messages were dozens a day and the computer wouldn't receive jobs properly so I was relying on the phone. It became unworkable so I turned the app off. Also, the car phone charger stopped working and I couldn't risk losing my only method of receiving jobs when the computer was down.
- I trialled both technologies and found that the Technology A app was the least effective.
- I did not have any issues practically or technology wise.
- I don't think I was the right target audience; I never receive or make calls whilst driving. I only have one attention span. I also often drive without the radio on for the same reason - so I can concentrate. This explains some of my "strongly disagree" scores as the technology didn't change my behaviours - I am already a safe driver who doesn't text/call whilst in transit.
- I believe hands free phone use is safe and this device placed me at risk for my work during the bush fires. I believe answering hands free and advising someone you will call back or telling them to wait until you can pull over is a better way of doing business and I felt less stressed as with this device I could have fifty phone messages and I could not get to them after a trip or even understand some of the messages and it is better to have a quick

conversation when driving. I found it interesting that the professors did not use hands free and were not in a commercial enterprise with no understanding of this how could this whole thing really take all factors into the mix.

- One would think with current technology, the issues identified above could easily be resolved.
- Great concept for those who lack the discipline to avoid phone in car use.
- Preferred the blocking due to auto messages sent when driving.
- I will probably continue to seek out other apps to see how they perform.
- Whilst I liked the feature I needed to concentrate to hear the voice telling me who had called when a call was blocked. This was probably as distracting and unsafe as having a hands free conversation or checking a text.
- Overall I think this app/hardware would improve road safety, I did notice that while driving my personal vehicle I was more conscious and didn't want to look at my phone.
- A useful device with only some minor improvements required for it to be truly effective.
- It takes away basic freedom.

Appendix L – Other comments regarding mobile phone use while driving

The participants were asked in the pre-trial questionnaire whether there were any other comments that they wanted to make regarding mobile phone use while driving. The content of the responses from the participants have not been edited, however, any reference to the commercial names of the specific technologies used by participants have been changed. The responses from the participants included:

- I receive phone calls advising me a job is cancelled. I just need to be able to glance at phone to see who is calling so I know if I need to pull over or it can wait until I get to the job. Since the Directive advising us not to use our mobile while driving I don't. I like my job. I used to get lots of phone calls out of the way on my way to work using hands free. This was in my own time. I now have to park on the side of the road and make these calls in (SA ORGANISATION NAME) time. I have never SMS'd while driving, that is dangerous.

- If using a mobile phone via hands free set up is legal, then using technology to block seems to take my choice out of the equation. More a matter of principle as I never make calls when driving.

- Not answering calls (especially important calls) could be distracting if you're aware the phone is ringing. Stopping all the time will also cause distraction (possibly).

- Since SAPN implemented a ban on mobile phone hands free use I have stopped using this phone and I believe customer service has degraded. My work life has become more stressful as people find it harder to communicate. They now send text messages which are more dangerous if one is tempted to look at them. It could only happen in a business that is not commercial or customer focused like (SA ORGANISATION NAME) and Government.

- Fully understand using mobile phones while driving is worse than driving under the influence of alcohol.

- I never text while driving, I never read texts while driving, "Built in" voice activates or hands free phone technology in vehicles for receiving is OK in my opinion. Perhaps not for initiating calls whilst driving. I tend to put phone on silent while driving and/or ignore incoming calls. Only recently forced habit. At times look at receipt of missed calls while stationary at lights or bumper to bumper slow traffic. But ignore if not family or near final on-route destination where return call can be made.

- As you know we cant use hands free while driving at work, I think this will have a negative impact on SAPN,I only make/answer calls on private phone in my own vehicle as it is hands free but I never text either read or send messages.

- Regarding Q20 and Q21 because text messages appear on the front of the iphone I can just look at it to read it without touching it. If it's longer than what's allowed on the front screen I don't pick it up to unlock it and read the whole message

- Please note that SAPN has a directive - no mobile phone use while driving, not even hands free

- I was a high use mobile user while driving until the directive 'SAPN' changed to 'no calls'. I would consider the circumstances before choosing to use my mobile (hands free). This was dependant on traffic, visibility on road verges, road conditions. I normally am in the vehicle by

myself and find that I more distracted when I have a passenger than when I am talking on my mobile hands free.

- I never answer calls or text in a car while driving a work vehicle. I may answer a private call (very rarely) and always look to immediately look to pull over as I don't have a hands free kit. I may look at a message while at traffic lights only. I definitely do either while driving - not that skilled! LOL
- If my phone rings while I am driving I get someone else to answer it or pull over.
- Phone should be on silent, no distracting tech 'dings'
- Phone blocking software should be activated 7 days per week not Monday to Friday (safety does not stop at the gate)
- Using bluetooth, hands free technology has allowed me the opportunity to communicate with my children and elderly parents driving to or home from work in 'personal time' as I have a long day and 45-50 minute commute each way. Staying in touch this way has been a valuable opportunity when we are all so time poor. This is what I will miss with the blocking technology installed.
- I'm not sure you need technology to do this. Just turn the phone off
- The risk of large fine and demerit point is what stops me using mine more so than any perceived danger with using, when in my own vehicle.
- Mobile phone use while driving can be done safely if it is fully automated, total hands free and voice activated so your hands never leave the steering wheel. This system has been an option on my last three private vehicles and it works well. I have done this because my work needs me to be accessible 24 hours a day 7 days a week every day of the year. Phone blocking would be an interference for me.
- Shouldn't need an app to manage peoples behaviours, as we have a policy of no phone use while driving an app should not be needed to enforce this policy
- I think it will be more of a hazard with a vibrating phone call coming in, you would tend to look at your phone more often to see who has called
- General phone use/habits altered as a result of SAPN phone use directive
- There is a distinct difference between hands free and holding a phone. Texts are a bigger distraction and more likely to cause an accident