

# **The Effectiveness of Cognitive Behavioral Therapy (CBT) in Reducing the Use of Mobile Phones While Driving**

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**Abstract:**

Numerous studies have indicated that people who use a mobile phone while driving have a greater chance of being involved in accidents than those who do not. There have also been many studies investigating the effectiveness of various interventions aimed at reducing the problem, but none of these has been from a social work perspective. This study, however, is based on this viewpoint, and investigated the effectiveness of Cognitive Behavioral Therapy in alleviating the problems caused by the use of mobile phones while driving. The study was developed using a quantitative research design, with a sample consisting of 38 university students who use their mobiles while driving. The students were chosen according to specific criteria, and thus formed a purposive sample. The study compared an experimental group who went through an intervention program with a control group. The results showed significance differences between the two groups in the degree of the use of mobile phones while driving; a specific scale measured the use by the two groups both before and after the intervention, as well as at a later follow-up stage. This indicated that CBT was successful in reducing the use of mobile phones while driving.

Keywords: Cognitive Behavioral Therapy (CBT) Intervention  
Driver distraction using mobile phone while driving

**Introduction**

Road accidents are now internationally recognized as a serious social concern, and are indeed considered to be one of the major causes of death worldwide. The road casualty rates are particularly high in the Gulf area, especially in Oman. According to statistics from the World Health Organization (2014), nearly 1.3 million people die in road accidents each year, making an average of 3,570 deaths a day.

Statistics from Association for Safe International Road Travel (2017) showed that the majority of casualties are young drivers, more than half of all road traffic deaths occur among young adults aged between 15 and 44. Although road traffic accidents rank as the ninth highest cause of death globally and account for only 2.2% of all deaths, they are the leading cause of death among young people aged 15-29.

Road Safety Authority (2010) has also indicated that the use of mobile phones while driving is the main cause of recent increases in the number of accidents. It increases the chance of a serious accident; if drivers are using their hands to make a call or to send a message,

they are not concentrating on the road or the movements of other cars. Using a mobile phone transfers the driver's concentration to the device and thus away from the vehicle. The driver's eyes are still likely to be directed at the road as they talk into their mobile phone, but although they might be looking, they might not be seeing adequately. In addition, the study by Dragutinovic & Twisk, (2005), showed that the driver's concentration and cognitive attention are shifted onto the conversation and away from the road environment.

Using a mobile to read or send text messages is also potentially dangerous. Texting (both reading and sending) requires more visual attention than calling. Furthermore, Gras, et al. (2007), indicated that the driver has to move his/her eyes away from the road to the phone in order to read or write messages, taking their focus away from the driving environment.

Indeed, texting while driving has been shown to be the most dangerous mobile activity to perform. Statistics in the US have indicated that "nearly 390,000 injuries occur each year from accidents caused by texting while driving. It is six times more likely to cause an accident than driving drunk" (National Highway Traffic Safety Administration, 2016, p. 4).

A variety of methods has been used in the attempt to reduce the use of mobile phones while driving; there have been legislative approaches, education campaigns and the use of new technologies. Many countries have introduced legislation to ban this practice. ROSPA (2003) mentioned that, despite these numerous attempts to deal with the issue through legislation, there is still only limited data on the effectiveness of this approach.

Educational campaigns have also been used to combat drivers' use of mobile phones. The aim of such a method is to change drivers' behavior by increasing their awareness of the dangers of what they are doing. Many of these educational campaigns have been conducted by cell phone service providers; the US, for instance, has seen AT&T's "It Can Wait" campaign and the "Put the Phone Down" campaigns in New Jersey. These campaigns have utilized posters, advertisements during movie screenings, and reminder messages on digital highway signs (Motor Vehicle Commission, 2008). In spite of the large number of such educational campaigns, not all researchers are convinced that these methods have proved effective in alleviating the problem.

A third approach to solving the problem is through technology, which could also play an important role in reducing drivers' mobile phone use by taking advantage of the sophisticated technological systems and applications found on mobile phones.

There are number of apps devices that help discourage from calling and texting while driving. For example, some of these apps put a lock on the texting function. Others let the drivers control the phone by putting it in airplane mode so when a text comes in, the phone doesn't even beep. Examples of such apps are live2Txt and drivemode. It is also important to consider another aspect of the problem, that some drivers carry out dangerous actions such as using a mobile while driving on a highway primarily because they hold erroneous and misguided beliefs. For example, they may think wrongly that they can differentiate between a dangerous and a normal situation, or that using a hands-free phone is not risky or that texting has the same risk level as making a call. With this in mind, a cognitive behavioral intervention could be a viable way to tackle the problem. The concept behind CBT is that our thoughts about a situation affect how we feel (emotionally and physically) and thus how we behave in a situation. As a result, it deals with problems based on wrong beliefs and behaviors by focusing on the way people think ("cognitive") and act ("behavioural").

CBT can be generally defined by Benjamin, et al. (2011) as a psycho-social intervention that focuses on the development of personal coping strategies that enable the solving of current problems and the changing of unhelpful patterns in cognition (e.g. thoughts, beliefs, and attitudes), as well as in behaviors and emotional regulation.

#### **Literature review**

A large number of studies have indicated that drivers who use mobile phones while driving are more likely to be involved in vehicle accidents than those who do not. Indeed, some researchers have shown that using a mobile phone makes a crash four times more likely (WHO, 2014).

Some drivers use headphones (hands-free phones) and see them as a safer option, but Caird, Willness and Steel & Scialfa (2008), indicate that using a hands-free phone carries the same level of risk as any other. Even though the driver's hands are not involved with the phone, talking still drags the brain away from the real world (the road), distracts the driver and decreases their concentration on the

road. The use of wireless phones has also been found to be unsafe. In the study by Irwin, Fitzgerald, and Berg (2000), have shown the detrimental effects of wireless phones on a driver's performance, especially in terms of reaction time, level of mental attention and degree of control of the vehicle.

Indeed, using a hands-free phone can lead to a more profound weakening of driving skills than that caused by intoxication. This evidence comes from a study of Burns, Parkes, Burton, Smith and Burch (2002), done in the U.K; this found that a driver's performance and his/her driving skills were more reduced by the use of a mobile phone than by intoxication.

The study of Drews, Yazdani, Godfrey and Cooper (2009), have shown the negative effects of using a mobile on driving performance. Given the agreement on the dangerously distracting effects of using a mobile phone while driving, Lesch and Hancock (2004), argued for the importance of raising driver awareness about the seriousness of this problem.

While, as shown earlier, a number of different interventions have been used in an attempt to reduce the problem, to date there has been little information on their effectiveness (WHO, 2014). Moreover, a social work perspective has rarely been brought to bear on this problem, the only exception being a study conducted in the U.S. and investigating Public Policy Interventions that targeted distracted driving behavior among millennials. Versuk's research (2016) concluded that millennials had a different definition of distracted driving, knew that they could usually get away with using mobile phones while driving, and felt that the advantages, even the necessity, of staying connected outweighed the dangers of accident or penalty.

Indeed, according to the study of Chriqui, O'Connor and Chaloupka (2011), public policy interventions and studies in general rarely consider or utilize evidence-based behavior modification theories.

However, research has shown that CBT is an effective treatment for a wide range of problems. For example, William's study (2003) has used for psychological disorders, Irene's study (2004) was applied for children's challenges, study of Taylor, et al, (2008) was applied with people with disabilities and Elsherbiny's study (2014) was in schools.

Although there have as yet been no investigations of CBT intervention with distracted drivers, it can be seen as a potentially suitable intervention for the problem as it works to change unhelpful patterns in cognition (e.g. thoughts, beliefs, and attitudes) and also in behaviors. The main purpose of this study, therefore, is to counter the erroneous assumptions of student drivers and provide them with a correct understanding of the dangers of distraction. Therefore, this paper attempts to investigate the effectiveness of Cognitive Behavioral Therapy (CBT) in reducing the use of mobile phones while driving.

### **Methodology**

The study used a quantitative research design with a quasi-experimental model design; this was in order to identify the effect of an independent variable, the cognitive behavioral intervention, on a dependent variable, the use of a mobile while driving.

### **Hypothesis of the study**

The present study was carried out based on one main hypothesis and three sub-hypotheses. The main hypothesis is that "cognitive behavioral intervention reduces using a mobile while driving".

The three sub-hypotheses emerged from the main hypothesis, are as follows:

- A. Cognitive Behavioral Intervention reduces calling while driving.
- B. Cognitive Behavioral Intervention reduces texting while driving.
- C. Cognitive Behavioral Intervention reduces use of the internet (calling, texting, browsing, etc.) while driving.

### **Participants**

According on the study by Engström's et al. (2004), the highest rate of road crash casualties in most countries around the world is found in drivers under the age of 25 , this study chose to deal with university students in this age bracket who use their mobile phones while driving. Participants were required to hold a valid driving license and to score highly on a scale measuring "Mobile phone use while driving", the scale assessed three types of drivers' mobile phone use: calling, texting and using the internet. A purposeful sample was used in the study, consisting of 38 students (15 male, 23 female) with a median age of 20.3; they all met the requirements of the study.

### **Sampling Procedure**

The study was carried out with students in the Department of Sociology and Social Work at Sultan Qaboos University in Oman. There were 282 social work students, of whom 102 were found to be meet the criteria given and thus to be eligible to participate. Of these, 19 declined to be tested by the mobile phone use scale, leaving 83 willing to complete it. When these students were measured on the scale, an analysis of the data showed that 73 students used their mobile phones for calling while driving, 62 used them for calling and texting and 41 students used them for all three activities - calling, texting and using the internet.

This latter group were the students deemed suitable for the intervention. These 41 were then given a contract form requesting their permission for the intervention; 38 agreed, while three declined to participate.

The students were then divided randomly into two groups: an experimental group (19 students) and a comparison group (19 students). The intervention was carried out only with the experimental group.

#### **Measurement**

##### ***Mobile phone use while driving Scale***

The scale was developed by White, et al, 2010. It contains of three demissions; calling, texting and using the internet while driving. Participants' use of a mobile phone while driving was assessed. In white, et al study (2010), the scale uses scores from 1 to 4, where 1 means the participant never uses their phone while driving; 2 indicates once to three times a week; 3 indicates once to three times a day; 4 indicates more than 3 times daily. This scale was used to report the frequency of each type of user. Example of scale questions is "How often do you texting on your mobile phone while driving?"

Validation of the scale was tested in another group of youth students with a sample size of 81 students. Inter-item correlations were all significant and ranged between 0.76 and 0.83.

The scale's reliability was tested through test-retest correlation within a period of 4 weeks. The reliability was found to be satisfactory ( $r = 0.78$ ). The value represents Pearson coefficients and is statistically significant. The internal consistency of the inventory was high (Cronbach alpha = .88).



### **Intervention Description**

Two methods of ethical protection were employed. First, ethical approval was sought from the Human Ethics Committee of Sultan Qaboos University, and was obtained. Secondly, as noted earlier, the participants completed and signed a consent form. The ethical considerations were that participants not be involved in any physically, socially or emotionally risky situations, that the confidentiality of participants would be ensured, and that participants would have the right to withdraw from the study at any time they chose. The intervention process was carried out by an advanced female master's student (with 3 years' experience in CBT) and took place over a 12-week period. The process included both whole group and individual sessions. The whole-group sessions consisted of cognitive behavior group intervention; these lasted one hour each and took place weekly over 12 weeks.

The therapist also conducted individual sessions lasting around 30-40 minutes each, with an average of five individual interviews per student over the 12-week period. The therapist was given intervention guidelines and outlines before the intervention period, and the author conducted hour-long weekly sessions to supervise the process.

### **Objective of Intervention**

The objective of the intervention is to reduce the Use of Mobile Phones While Driving. Many sub-objectives were emerged from the main objective, which are: (1) reduce calling while driving, (2) reduce texting while driving and (3) reduce using the internet while driving.

### **Steps of Intervention**

The intervention was divided into three steps, making up a total of 13 sessions.

*Step One: Sessions 1-3: Identify inaccurate knowledge and its negative effects on behavior (Identifying and clarifying the problem; the pre-intervention step).*

This step has three aims: first, to identify negative knowledge and behaviors and their negative consequences; second, to identify the students' knowledge about the problem and third, importantly, to acquaint the students with CBT.

*Step Two: Sessions 4-9: Changing knowledge and behaviors (the beginning of the intervention).*

The aim of this step is to counter participants' inaccurate knowledge and the consequent dangerous behavior; this is done when participants acquire new and accurate knowledge on this issue. At this

stage, students were provided with information about the dangers of using a mobile while driving and they were also given assignments which would build their knowledge about the safe and proper use of mobile phones.

***Step Three: Sessions 10-12: Sustainability (Maintaining Changes)***

The aim of this step is to strengthen and reinforce new positive behaviors and cognitive practices by rewarding desirable reactions. During this stage, the therapists conducted 100 sessions: there were five interviews per individual participants, as well as 24 group sessions.

**Strategies and Techniques of Intervention**

A number of strategies and techniques used to achieve the intervention goal, are cognitive restructuring, modeling, cognitive, home assignments, social counseling, reinforcement, relaxation, training and peer support. More details about Strategies and Techniques of Intervention are as follow:

One common strategy was **Cognitive Restructuring**; this was used to build correct knowledge and valid beliefs about the problem, and to change wrong and illogical beliefs and knowledge, replacing them with positive thoughts. This technique was used here to help students to acquire new knowledge and beliefs related to their behavior. One example of the application of this strategy was watching some videos.

Different forms of **Modeling** were also used. For example, the students were given instructions so that they could model certain behaviors through role play. In these scenarios the therapist took advantage of the experience of students who had accidents before. Also, the intervention action plan also included **cognitive home assignments**, in which the students were given homework and other tasks like reading certain books or applying certain rules to help them to change their behavior. Students also received **social counseling** that addressed their particular problem.

An important factor used in all the intervention stages was **reinforcement**; this was used to maintain the progress achieved by the other strategies and techniques. Participants received positive reinforcement depending on how far and how well they achieved the desired behaviour (the tasks). Examples of the reinforcements were rewards such as shopping vouchers, free meals in restaurants, free gas

coupons, free meals at the students' union and free coupons for the games center (bowling & billiards) at the Students' Union.

One of the most interesting techniques used in the intervention was **relaxation training**. This was used to help students to feel more comfortable and included the teaching of techniques such as deep breathing and relaxation while listening music.

The students were also given **peer support** and assistance by their friends to remind them of the rules and help them to follow them.

A number of **behavior change strategies** were also used to change the participants' use of their mobiles while driving, notably by decreasing their frequency of use. These strategies aimed to motivate students to apply new behaviors and to improve their focus on the road.

They were taught, for example, not to use their phones while waiting at traffic lights or in traffic jams, but to listen to music instead. The therapist used motivation, role-play, positive reinforcement, over-correction, training, modeling and extinction techniques while implementing these strategies. In addition, she used students who had actually had accidents to show the results of wrong behavior in the modeling and role play activities.

After the intervention was over, the therapists conducted one final session (session number 13) in order to ensure that the undesirable behavior would not re-emerge, and in order to measure the students' new rates of mobile phone usage while driving.

## Results

**Table 1. Demographic characteristics of the study sample (n=38)**

Characteristics	Experimental (Intervention) group	Control (Comparison) group	Overall
Mean age, y	20.7	21.19	20.95
Female, %	11	12	
Male, %	23 8 15	7	
Involving in an accident due to using mobile while driving	2	1	3
Ways of using Mobile			
Hand Free	1	2	3
Blue tooth	1	1	2
Hand Held	12	11	23

Table 1 reveals the demographic characteristics of the study sample. The mean age of the intervention group was 20.7, whereas in the control group it was 21.19. Also, as the table indicates, about 61% of the students in the study were female. In the intervention group, two students had already been involved in an accident due to using their mobiles while driving, while only one student in the control group had had a similar experience. Overall, Regarding ways of using mobile, the majority of the students (61%) used hand-held mobiles, with only around 8 % using hands-free phones, and about 5 % using Bluetooth.

**Table 2. Results of t-test for Comparison (n=14) and Intervention Group (n=14) for the first sub hypothesis (t-table = 2.422 and  $\alpha = .05$ )**

Stage	Groups					Decision of Significant
	Comparison		Intervention			
	Mean	SD	Mean	SD	T	
Before Intervention	3	0.63	3.1	0.567	0.708	Not Significant
After Intervention	3.1	0.567	1.6	0.516	7.792*	Significant
Follow Up	2.909	0.539	1.5	0.707	5.514*	Significant

\*p < .05.

Table 2 shows the results of t-test regarding calling while driving for both the research groups, with results given for three points of time: before the intervention, after it, and at the follow-up stage. The results for the point before the intervention showed no significant difference between the intervention and control/comparison groups ( $t = .70$ ,  $\alpha = 0.05$ ). However, the table shows differences between the control and intervention groups after the intervention ( $t = 7.79$ ,  $\alpha = 0.05$ ). These differences were even more significant at the follow-up stage, with a result of  $a = 0.05$  ( $t = 5.51$ ).

These results support the first sub-hypothesis of the study, which is that “Cognitive Behavioral Intervention reduces calling while driving”.

**Table 3. Results of t-test for Comparison (n=14) and Intervention Group (n=14) for the second sub hypothesis (t-table= 2.422,  $\alpha = .05$ )**

Stage	Groups					Decision of Significant
	Comparison		Intervention			
	Mean	SD	Mean	SD	T	
Before Intervention	2.7	0.823	3	0.942	0.458	Not Significant
After Intervention	2.9	0.316	1.6	0.699	4.315*	Significant
Follow Up	2.8	0.421	1.5	0.527	9.36*	Significant

\*p < .05.

Table 3 shows the t-test results for the two groups for texting while driving, measuring at three points as was done for calling while driving.

The results indicates that there was no significant difference between the intervention and control groups before the intervention  $\alpha = 0.05$  ( $t = 0.82$ ), but that a significant difference was found after the intervention ( $t = 4.31$ ) and at the follow up stage  $\alpha = 0.05$  ( $t = 9.36$ ). On the basis of these results, the second sub-hypothesis, that, "Cognitive Behavioral Intervention reduces texting while driving", is accepted.

**Table 4. Results of t-test for Comparison (n=14) and Intervention Group (n=14) for the third sub hypothesis (t-table= 2.422,  $\alpha = .05$ )**

Stage	Groups					Decision of Significant
	Comparison		Intervention			
	Mean	SD	Mean	SD	T	
Before Intervention	2.8	0.632	3	1.054	0.613	Not Significant
After Intervention	2.9	0.316	1.6	0.699	4.315*	Significant
Follow Up	2.8	0.421	1.4	0.516	3.117*	Significant

\*p < .05.

Table 4 shows the t-test results for the two groups for using the Internet while driving, measuring at three points as was done for calling while driving and for texting. Again, the results indicate that there were no significant differences between the experimental and comparison groups before the intervention ( $t = 0.613$ ), but that significant differences between the two groups were apparent after the

intervention and at follow up ( $t= 4.315$  &  $t= 3.117$ ). Thus, the third sub-hypothesis, which is "Cognitive Behavioral Intervention reduces use of the internet (calling, texting, browsing, etc.) while driving", is accepted.

As shown above, there were significant differences between the intervention group and the control group, in that the t-tests for the intervention group revealed distinct and positive changes in all the three dimensions. These changes took place between the test point before the intervention and the test point after the intervention, and continued at the follow up stage. There was no evidence of these changes in the control group. It therefore follows that the main hypothesis, that "cognitive behavioral intervention reduces the use of mobile phones while driving", is accepted.

The main hypothesis is in line with several other studies Versuk (2016); Rohl, Eriksson & Metcalf., (2016), as are the sub-hypotheses. The first sub-hypothesis is confirmed by Clayton, Helms and Simpson (2006), the second by Hosking, Young and Regan (2009), and the third by the study of Drews (2009) and National Highway Traffic Safety Administration. (2016). All these studies showed the effectiveness of cognitive behavioral interventions in reducing problems associated with the use of mobile phones while driving.

### **Discussion**

The present study aimed to examine the effects of using CBT in reducing the use of mobile phones while driving. Before the intervention was carried out, all the students in both groups (intervention and comparison) were assessed as having the problem, as were those tested by Rohl, et al. (2016).

The findings indicated the positive effects of CBT on students who used their mobiles while driving. The therapy techniques used in the intervention group significantly reduced the three types of problem behavior under investigation. Both groups were tested before and after the intervention and at the follow-up stage, with the control group showing no difference between the stages, while there were significant differences within the intervention group after the intervention and in the follow up stage. In line with this, the findings showed significant differences between the control group and the intervention group at the two later stages.

The student participants revealed that, before the intervention, many of them held erroneous beliefs about using a mobile phone while driving. For example, many believed that it was not remotely hazardous to do this. Furthermore, even those students who appeared to be aware of the general risks associated with the activity, felt that they personally were immune to its dangers. Others believed that they could differentiate between dangerous and non-risky / normal situations, so were not at risk. Other examples of false beliefs were that using a hands-free phone is not risky, or that texting carries a similar level of risk to calling. Given the prevalence of misguided beliefs in the group, an intervention based on cognitive restructuring and cognitive home assignments seemed suitable, and were indeed effective in correcting wrong cognition and building new beliefs.

Training students through individual interviews and in small-group sessions helped them to learn new skills which resulted in a reduction of their use of mobile phones while driving.

As mentioned earlier, only a few of the participants used hands-free phones (8%) and Bluetooth sets (5%) while driving; the majority used hand-held phones (61%). These figures are surprising, given that using hand-held phones while driving is illegal in all Gulf countries, including Oman. Moreover, because of the high cost of phone calls in Oman, a good number of students rely on text messages to communicate, an even more risky behavior.

CBT was effective in stopping mobile phone usage while driving. There are a number of factors that could explain this result. First, the sample participants are all educated to university level, and had a high level of commitment to attending the sessions and to successfully carrying out the action plan and assignments. Second, the experimental group was small in number, and this enabled more focused interaction with the participants, including in the follow up.

Additionally, being able to use the university internet (the sessions and interviews were held on campus) helped the author to build a good level of knowledge and cognitive reconstruction in the students, during both group sessions and individual interviews. It also enabled the use of different resources, such as You-Tube films. Another factor that helped to limit the dangerous behaviors was encouraging the students to use new phone applications that block the ability to call and text while driving. Also, the students were all keen to counter their behaviors, which helped them to successfully complete their tasks and assignments.



This research corroborates other studies (ROSPA, 2003; Rajalin, et al, 2005; McCartt, Braver and Geary, 2003) that have indicated the effectiveness of short-term treatment in attempts to reduce the use of mobile phones while driving. This study, however, is the first of its kind in Oman to use CBT as a short-term treatment.

Despite the clear importance of providing students with knowledge about the dangers of using mobile phones while driving, it was also crucial to provide them with knowledge of the technological applications that could help them to correct these habits.

Another factor that positively affected the intervention was the considerable experience of the master's students who facilitated the process. Both practitioners had prior experience implementing CBT based therapies, having carried out CBT intervention with the author twice previously, and having received prior training.

In summary, although there has been limited, even rare, intervention research into dealing with this problem, the present study is in agreement with applied international researches such as WHO study's (2014) and Versuk's study (2016) that indicate that the use of mobile phones while driving can be effectively reduced through a variety of interventions, such as educational campaigns and research-based monitoring of Public Policy Interventions.

#### **Limitation and Suggestion**

There are two key limitations to this study. Firstly, because the sample was made up of students at Sultan Qaboos University, they may differ from the general population in some respects. Also, the sample size was small, so the results of the study should be viewed with caution.

The statistical power of the results could be enhanced, however, if similar studies were done with a larger sample. CBT should also be used with different, and more diverse, categories of people, and with another age group. Additional research should be undertaken that concentrates on drivers' thoughts around the issue of using their mobile phones while driving; this would give a clearer picture of how to create the most effective educational campaigns to deal with the problem. Further research is also needed to examine the relationships between the driver's age, gender, ways of using mobile phones while driving, and their history of accidents.



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