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Mobile Phone Usage and Its Effects on Pedestrians' Distraction

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Abstract

Background: The use of mobile phones in the world today is growing rapidly and consequently its related problems in various areas of cultural, social and economical are growing.

Objectives: The current research was concerned with aspects of mobile phone use and pedestrian distraction when talking on a mobile device.

Patients and Methods: The present survey took place on a university campus. Five objects were placed along the route. Volunteers participating in the study were divided into two groups. The experimental group received phone calls their entire path, while the control group did not receive any phone calls. At the end of the survey, the participants were asked which of these objects were seen along the path.

Results: The results revealed that 20% of the answers were correct for the participants in the call condition group, while 74% of the answers were correct for the participants in the no call condition group. Results indicate that there are significant differences between the two groups from the response aspect.

Conclusions: The findings of the present study suggest that cell phone usage while walking can decrease the perceptual visual field, make pedestrians less aware of the surroundings and put them at the risk of having an accident, getting injured or death. It is necessary to give pedestrians adequate training in the field of mobile device usage and its possible risks as well as teach them its appropriate use. They should also be taught to put their cell phones away while walking in the street especially when they are crossing a street or at the intersections.

Keywords: Distraction, Mobile Phone, Pedestrian

1. Background

The use of mobile phones in the world today is growing rapidly and consequently its related problems in various areas of cultural, social and economical are growing. Regarding the fact that 77% world population owns a cellphone, it was estimated that 6.1 trillion messages were sent worldwide in 2010, which is tantamount to 200,000 messages every second (1). The percentage of Iranians who use a cellphone to access the Internet, email, or instant messaging has increased. According to the union, the mobile phone penetration rate of 84% has been declared in Iran, which shows a significant rise in recent years (2).

WHO reports that it is astonishing that the pedestrians make 22% of all traffic fatalities of the world's roads annually, where more than 270,000 lose their lives. Moreover, it is substantiated that this percentage accounts for two thirds of all traffic deaths in some countries (3). However, in Iran more than 70,000 pedestrians were injured and more than 4,000 lost their lives illustrating that 22% of all road traffic fatalities and nearly 55% of them were in urban areas (4).

Although counter measures such as street and intersection designs or dangerous driving can be responsible for pedestrians' injuries, studies show that reckless behavior causes 15% of pedestrians' accidents (5). It is reported that pedestrians are distracted by many interferences such as smoking and listening to music, but the most common distractor is the inappropriate use of a cellphone (5-7). There is a rapid increase in the number of pedestrians who use cell phones for talking or text messaging while crossing the street (8-11). It seems that cellphones have become increasingly advanced, allowing pedestrians to do much more than just making a phone call or sending a text message.

Given the complexity of accurately judging the safety of a street crossing, along with the necessity of devoting careful attention to key stimuli, the task of crossing a street likely becomes even more challenging when pedestrians become distracted by attempting to use a cellphone (12). If attention is directed elsewhere, the cognitive processing needed to make a safe street-crossing decision may become disrupted and may be less effective (13).

Distracted pedestrians cause many pedestrian injuries. Strayer and his colleague's (14) conducted a survey in the United States on 699 people who had been involved in an

accident with a vehicle. The results indicated that 25% of them were talking on their cellphones 10 minutes before the accident. Two possible sources of distraction for cellphone use are documented. The first kind of distraction refers to the physical aspect of holding the phone and dialing (15-17) and the second one pertains the person's attentive resources to the conversation on the cellphone (18-21).

Since crossing the street requires considerable cognition and attention, pedestrians using a cellphone are less likely to look at traffic before crossing, to wait for traffic to stop, to look at traffic while crossing or to walk briskly (6). Hyman et al.'s (22) findings proved that using cellphones while driving could cause some problems, for example, pedestrians using cellphones took a longer time to get to their destination, changed directions frequently and were less aware of their unusual surroundings at considerably higher levels than those pedestrians who were not on their cellphones. They also concluded that pedestrians talking on cellphones in a simulated environment took longer to cross the street and paid less attention to traffic; to put it precisely, pedestrians had more missed opportunities crossing against traffic and more simulated hits or close calls than those pedestrians with no cellphone distraction (13, 23). Thompson and her colleagues (9) indicated that nearly one-third of pedestrians (29.8%) were distracted by their mobile devices while crossing the street.

Schwebel et.al in 2012 conducted a research to determine the effectiveness of activities such as listening to music, talking on their mobile device and sending and receiving messages by mobile phone on the distraction of pedestrians on 138 students from University of Alabama in a semi-virtual pedestrian crossing environment. Results clearly showed that doing these activities considerably reduces the consciousness of passers by doing these activities and the probability of collisions with motor vehicles increases. The study also revealed that the probability of pedestrian accidents is more in those who are distracted with writing the text or listening to music than those who are distracted by conversation (13).

Hatfield and Murphy (6) conducted an observational study on 270 women and 276 men who were crossing the street and found that amongst both of them, time of crossing the road increased when using the phone, and therefore, the likelihood of crash of motor vehicles would increase. Alternatively, Nasar and Troyer (24) conducted a study on pedestrians' injury that used mobile phones in public places; they used a national electronic injury surveillance system (NEISS) to find the number of injuries caused by cellphone use amongst drivers and pedestrians (24).

Thomson et al. (9) conducted a study to find out the impact of distraction caused by technology on pedestrian crossing behaviors. They did their study in 20 high-risk intersections in Seattle America in three different random time intervals. Pedestrian crossing behaviors of 1,102 people were recorded, results showed that about one third (29.8%) of pedestrians were involved in distraction when crossing the street. These distractions include listening to music (11.2%), writing short messages (7.3%) and mobile phone use (6.2%). The average crossing time indicated that when writing messages, it took about 18% more for crossing, which showed that these people were at risk about 3.9 times more than normal people (9).

Alternatively, Neider et al. (8) investigated the effects of mobile phone usage and listening to music amongst the pedestrians. The study was conducted on 36 patients (19 females and 17 males with a mean age of 21.75 years, age range 18 - 30 years) at the University of Illinois in a virtual environment pedestrian crossing. The research results showed that pedestrians who used their cell phone when crossing the street and who listened to music, compared to ordinary people, were less likely to cross the street successfully.

Given the fact that little is known about the impact of mobile phone usage on pedestrians' distraction as mentioned above and due to the scarcity of research on this topic, the present researchers aim to investigate the effects of mobile phone use on the pedestrians' distraction in Iran.

2.Objectives

The current research was concerned with aspects of mobile phone use and pedestrian distraction when talking on a mobile device.

3. Patients and Methods

3.1. Methods and Data Collection Procedures

3.1.1. Participants

The present study included 60 (30 males and 30 females) university students from the Islamic Azad University of Gorgan, Iran, who were asked to take part in the mobile phone test. All participants had normal vision or corrected to normal vision (full color vision: 20/20).

In order to prevent participants' awareness from the purpose of the survey, which could possibly affect the results of their consciousness, it was announced to all the participants that this study would only examine the performance of mobile operators on the university campus. The participants took part in the survey after introduction to and signed a consent form. This study was approved by the ethics committees of Golestan University. Written informed consent from all participants involved in the study was obtained.

3.2. Study Design and Procedures

A specific route was selected for the field experiment, within the University of Gorgan campus, Iran. The total length of the route was 500 meters. The survey was carried out during September 2014 when the university was open. Prior to the study, the participants filled out a brief questionnaire regarding their personal characteristics, especially mobile phone usage.

Volunteers participating in the study were divided into two groups. The experimental group received phone calls all the way through while the control group did not receive any phone call. The participants in the experimental group, conversation mode, were asked questions regarding a variety of mobile operators on the way, presented in Table 1, whereas the participants in the control group, not in conversation mode, were announced to continue their path if they had no calls and wait for calls.

Table 1. Sample Conversations Used for Phone Distraction Situation

Sample Conversations
Hi, what's your name?....
Hi, my name is...
What's your last name?...
My last name is ...
What do you use your mobile operator?...
I use from ... operator.
Why did you choose this type of operator?
I choose this operator because ...
Which mobile operator your friends use?
Most of my friends use from... operator.
Do you use of your cell phone's internet?
Do you ever use the video calling system?
How many hours a day do you use a cell phone mean?
Do you have information about a third generation mobile operator?
Do you have suggestion on improving services for mobile operators?
We appreciate your cooperation in this investigation.

Before the study, five "out of place" objects had been placed along the route, two at eye level, the safety word and danger sign and three at ground level, cans, polystyrene and a shoe. At the end of the test path, few tables and chairs were placed so that volunteers in both groups could enjoy short entertainment while they were asked to fill out a questionnaire.

Each of the five objects of the study was placed in a four part picture series of other objects. Figure 1 shows that the cans were amongst cups, bottle and crumpled paper. Strictly the stop sign was in combination with danger sign, stop sign and pedestrian crossing sign. The safety word was amongst, warning, risk and attention words. The shoe picture was combined with pictures of rope, empty box and tap and polystyrene was combined with images of cement, rebar and brick. In the questionnaire, participants were asked which of these objects were seen along the path.

All the participants responded to five questions at the end of the survey and correct and incorrect answers were written on a separate table for each group. At the end of the study, the researchers explained the purpose of the research and expressed their apologies to the participants who were provided with fictional information.

4. Results

The analysis of the data revealed that 20% (30 correct answers out of 150 questions) of the answers were correct for the participants in the experimental group, while 74% (111 correct answers out of 150 questions) of the answers were correct for the participants in the control group. Data was analyzed using the SPSS Software version 20. Chi-square method was computed where significance level of the study was set at 95% with an alpha level less than or equal to 0.05.

According to Table 2, it is observed that the static value of test is 87.79 and sig = 0.00, namely $p < 0.05$, which indicates that there are significant differences between the two groups with regards to their responses.

5. Discussion

It is documented that there is a direct correlation between the number of cellphone users and injuries. In other words, the more usage of cellphones results in more injuries. Pedestrians' deaths and accidents may occur as a result of using a mobile phone if distracted while crossing the street.

The results of this study show that there is a significant difference between the two pedestrian groups, namely conversation and no-conversation mode (30 correct answers as compared to 111 correct answers out of 150 questions). Result of this study was consistent with previous researches that that pedestrians talking on cellphones took longer to cross the street and paid less attention to traffic (8-22). The results also show that alertness and ability to recall events are significantly reduced while using a mobile phone.

The findings of the present study are in line with previous studies corroborating that mobile phone conversation

Figure 1. Four Part Picture Series on the Questions at the End of the Survey

Table 2. Chi-Square Test Between Two Groups (Impact of Distraction)[a]

	Value	df	Asymp. Sig. (2-Sided)	Exact Sig. (2-Sided)	Exact Sig. (1-Sided)	Point Probability
Pearson Chi-Square	87.796[b]	1	0.000	0.000	0.000	
Continuity Correction[c]	85.642	1	0.000			
Likelihood Ratio	92.770	1	0.000	0.000	0.000	
Fisher's Exact Test				0.000	0.000	
Linear-by-Linear Association	87.503[d]	1	0.000	0.000	0.000	0.000
N of Valid Cases	300					

[a] For 2x2 crosstabulation, exact results are provided instead of Monte Carlo results.
[b] 0 cells (.0%) have expected count less than 5. The minimum expected count is 70.50.
[c] Computed only for a 2x2 table.
[d] The standardized statistic is -9.354.

might result in pedestrians' distraction and increase the risk of pedestrians' crashes (25-28). Talking on cellphone considerably reduces attention to the unusual surroundings which leads to many accidents.

Given the importance of the matter and a large number of pedestrians who are injured or lose their life every year due to the usage of mobile phones while crossing the street, it is essential that legislation enact strict laws for

this group of pedestrians. However, if enforcement of law is difficult, people should be made aware of the possible dangers involved. However, legislation alone cannot be enough.

5.1. Conclusions

Due to the fact that the use of mobile technology is growing in recent years, it is necessary to spread public awareness and provide a better and safer environment for pedestrians. It is mandatory that individuals should be educated and they should be made aware of the possible dangers involved. For instance, it may be influential to put up information regarding the dangers involved around the areas where pedestrians would approach the intersections and cross walks. Moreover, parents should train their children in different fields. It is necessary to be given adequate training in the field of mobile phone usage and its possible risks as well as teach them its appropriate culture. The children should be taught to look at both sides of the street when crossing the street. They should also be taught to put their cell phones away while walking in the street especially when they are crossing a street, or when they are at the intersections.

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Footnotes

Authors' Contribution: All authors (Seyed Rasoul|Davoodi and Naser Alejalil) participated in the study design, the conception of research questions and the drafting of the paper. Naser Alejalil led the work and wrote the first draft of the paper.

Conflict of Interests: The authors declare that they have no competing interests.

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