

Car phones and car crashes: some popular misconceptions

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On February 13, 1997, we published the lead article in a widely cited medical journal, in which we reported an association between cellular telephone calls and motor vehicle collisions.¹ During that week we participated in more than 50 media interviews because we think scientists have an obligation to communicate with society. During subsequent years we have stayed in the academic field analyzing the limitations, implications and misquotations of our research.²⁻⁶ We are not activists on a public crusade. We are not lobbyists with a mission.

Careful science tends to follow a conservative design, is written in a modest manner and emphasizes the limitations of current data. As a consequence, all of our past research provided plenty of fodder for those who oppose laws that prohibit using a cellular telephone while driving. The purpose of this commentary is to take the alternative position and to explain how our research might have underestimated the risks associated with using a cellular telephone while driving. Other studies in support of potential regulations are not reviewed here.

In our research, we found that drivers were 4 times more likely to have a collision when using a cellular telephone

than when not using a cellular telephone. What we wish we had explained more clearly in our article, however, was that this increase was not calculated in comparison to the risk of collision under ideal circumstances of no distractions.⁷ Actually, the increase was relative to the risk of collision when the driver drove with his or her usual background distractions. Making calls on a cellular telephone is distinctly more risky than listening to the radio, talking to passengers and other activities commonly occurring in vehicles.

Traditional statistics create subdued impressions. In our work, the 95% confidence intervals were skewed so the estimated relative risk spanned from 3 to 6. The records of telephone use were not accurate to the second and our measures of driving patterns were also inexact; together, such imprecision biased the risk estimate toward finding nothing. Our cohort also included a few drivers who did not call while driving, and this made the entire group seem a bit protected from collisions. In contrast, arguments based on anecdotes and not statistics can yield a dramatic impression⁸ (e.g., a news report that a driver was talking on a cellular telephone and smashed into another vehicle, killing 2 people⁹).

Our study evaluated drivers who owned a cellular tele-

phone, had been in a motor vehicle collision and consented to have us review their detailed cellular telephone billing records. We analyzed no records without signed informed consent. As a consequence, people who were reluctant to participate because of concerns about personal liability were excluded from the analysis. These exclusions can cause our analysis to underestimate by an order of magnitude the risk associated with using a cellular telephone while driving.

We studied drivers who used the technology according to their discretion, which may also have veiled the true extent of hazard. Specifically, drivers often have a sense of self-preservation and may be less likely to initiate or receive calls in particularly bad driving circumstances. As such, the calls that do occur tend to be preselected and biased toward taking place in relatively safe circumstances. In turn, our estimate of the degree of risk is diminished because of these transient behavioural offsets from a few conscientious choices.

Sometimes people misunderstand research findings because relative risks are not the same as absolute risks. If a driver believes that he or she has superior skills and is immune to collisions, for example, then cellular telephone calls would seem perfectly safe (because a 4-fold increase in nothing is still nothing). However, a widespread sense of security is unwarranted because more than 600 000 reportable collisions occur in Canada each year.^{10,11} Most of these collisions come as a complete surprise to drivers and allow no time for evasive manoeuvres.

Many people might endorse stricter road safety regulations if they themselves were exempt. This position indicates a failure to realize that the drivers we studied in the aftermath of a crash suddenly regretted their use of a cellular telephone. Presumably, feelings of frustration are also shared by people inconvenienced in traffic jams caused by someone else making a call while driving. Moreover, bad driving imposes major risks on others; for example, in Ontario for every 10 driver fatalities there are also 5 passengers killed and 2 pedestrians killed. On average, every 10th person who dies is a child.¹¹

Our findings were robust. Relative risks were about the same during the day and night, suggesting that the observed association was not due to alcohol consumption, eyesight or other confounders in the driver's condition. Relative risks were the same in the winter and summer, suggesting that the results apply to a wide range of road surface conditions. Relative risks were about the same for calls that were placed by the driver and those that were received by the driver, suggesting that the act of dialing was not the main factor contributing to the hazard.

To avoid legal complexities, we studied collisions that caused property damage but not personal injury; hence, we do not know directly if the association extended to fatal crashes. Yet any collision might result in serious injuries because of air bags, motorcycles or combustibles. In addition, we found greater relative risks for calls in high-speed than in low-speed locations (5.4 v. 1.6, $p = 0.014$). These indirect findings support other research suggesting that the use of cellular tele-

phones while driving contributes to lethal collisions.^{12,13}

Education is always an alternative to regulation. However, our study suggests that education may not be sufficient because the increase in risk persisted even for drivers with years of experience with a cellular telephone. This implies a fundamental limitation in human performance (e.g., attention span). Educational efforts might also be diminished by spirited advertising by industry and by the incidental glamorization of cellular telephones by filmmakers who use the device to inject more dialogue and action into a single movie scene.

These many distinctions suggest that our study underestimated the risks and did not miss important nuances. Thus, regulations against using a cellular telephone while driving may be justified, more cost-effective than generally realized and especially attractive if emergency calls are allowed. Experience from other countries shows that such regulations are acceptable to drivers, are feasible to enforce and generate adherence similar to the local seatbelt laws.¹⁴ Ironically, many of these countries enacted regulations on the basis of far less scientific evidence than available today.

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Competing interests: None declared.

Contributors: Drs. Redelmeier and Tibshirani both contributed to researching, writing and revising the manuscript.

References

1. Redelmeier DA, Tibshirani RJ. Association between cellular-telephone calls and motor vehicle collisions. *N Engl J Med* 1997;336:453-8.
2. Redelmeier DA, Tibshirani RJ. Interpretation and bias in case-crossover studies. *J Clin Epidemiol* 1997;50:1281-7.
3. Redelmeier DA, Tibshirani RJ. Is using a car phone like driving drunk? *Chance* 1997;10:5-9.
4. Tibshirani RJ, Redelmeier DA. Cellular telephones and motor vehicle collisions: some variations on matched pair analysis. *Can J Stat* 1997;25:581-91.
5. Min ST, Redelmeier DA. Car phones and car crashes: an ecologic analysis. *Can J Public Health* 1998;89:157-61.
6. Redelmeier DA, Weinstein MC. Cost effectiveness of regulations against using a cellular telephone while driving. *Med Decis Making* 1999;19:1-8.
7. Redelmeier DA, Tibshirani RJ. Cellular telephones and traffic accidents [letter]. *N Engl J Med* 1997;337:127-8.
8. Menzies D. Selfish cellphone users have Toronto police chief fuming. *National Post* 2000 Dec 8;Sect E:2(col 1).
9. Phoneslaughter? Felony charges in distracted driving case. *ABCNews.com* 2001 Apr 16. Available: www.abcnews.com/sections/us/dailynews/cellular010416.html (accessed 2001 Apr 30).
10. Bureau of the Census. *Statistical abstract of the United States: 1996*. 116th ed. Washington: The Bureau; 1997. p. 832.
11. Ontario Ministry of Transportation. *Ontario Road Safety Annual Report 1997*. Downsview (ON): Safety Research Office, Ministry of Transportation; 2000. p. 2.
12. Dreyer NA, Loughlin JE, Rothman KJ. Cause-specific mortality in cellular telephone users [letter]. *JAMA* 1999;282:1814-6.
13. Violanti JM. Cellular phones and fatal traffic collisions. *Accid Anal Prev* 1998;30:519-24.
14. Lissy KS, Cohen JT, Park MY, Graham JD. *Cellular phone use while driving: risks and benefits*. Boston: Harvard Center for Risk Analysis; 2000.

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