Unsafe driving in North American automobile commercials

Phillip C. Shin, David Hallett, Mary L. Chipman, Charles Tator and John T. Granton

Abstract

Background Motor-vehicle crashes (MVCs) are a leading cause of death of young Americans and Canadians. Aggressive driving and driving at high speed are frequently cited as contributing to crashes. Consumer and safety associations have raised concern that driving behaviour portrayed in automobile commercials may influence consumer-driving behaviour. However, the prevalence of aggressive driving in automobile commercials has not been systematically evaluated.

Objectives To identify the prevalence and types of unsafe driving that are portrayed in United States and Canadian televised automobile commercials as well as the use of safety promotion and disclaimers.

Design All English language automobile and truck commercials (≥30 seconds in length), airing nationally on major broadcast and cable networks in either the United States or Canada during January or July between 1998 and 2002 were assessed by three independent raters for the presence and type of unsafe driving activity, presence of safety promotion and the use of written disclaimers in each commercial.

Results Of 250 total commercials, 113 (45 per cent) contained an unsafe driving sequence as determined by at least two of three raters. Unanimous agreement as to the presence of an unsafe driving sequence was found in 63 (25 per cent) commercials. Aggressive driving accounted for 85 per cent of the unsafe driving sequences, including 56 per cent with speed violations. Safety promotion was present in 30 (12 per cent) commercials. Of 141 commercials in which the gender/sex of the driver was shown, 115 (81 per cent) displayed a male driver.

Conclusion Unsafe driving is prevalent in North American automobile commercials. Given the extent to which MVCs are a public health and economic concern, this finding seems in conflict with responsible advertising. The degree to which the portrayal of driving in automobile commercials affects consumer-driving behaviour should be an area of further investigation.

Keywords: automobile advertising, motor-vehicle crashes, trauma

Introduction

Motor-vehicle crashes (MVCs) are the leading cause of death of North Americans between the ages of 1 and 45. In 2002, there were 6.5 million MVCs resulting in almost 45,000 deaths and 3.5 million injuries in the United States and Canada. Beyond the personal losses, the economic costs of MVCs are significant. In addition to treatment in emergency departments and critical care units, patients involved in MVCs often require long-term rehabilitation. The annual health-care costs in the United States have been estimated at over $32 billion. The total annual economic cost of MVCs has been estimated at $230 billion in the United States and between $7.5–20 billion in Canada. Owing to this enormous economic burden and the tragic personal consequences of MVCs, many studies have assessed risk factors and safety issues for MVCs. Aggressive driving, particularly among young male drivers, is commonly cited as a risk factor for fatal and non-fatal MVCs. In a study commissioned by the National Highway Traffic Safety Association, aggressive driving behaviour was found to be a major concern of motorists. Sixty-two per cent of people surveyed reported that the behaviour of another driver has been a threat to them in the last year, 75 per cent felt that it is important to do something about unsafe drivers, and 33 per cent report that they feel driving is more dangerous now than a year ago.

Automakers spend almost $9 billion annually in advertising in the United States to promote their products, including $6.5 billion on television advertising. In Australia and New Zealand, the automotive industry has agreed to a voluntary code of practice for motor-vehicle advertising. In the United Kingdom, the regulatory body for television programming enforces...
specific standards for the content of automobile commercials.\textsuperscript{15} It is not known what impact these guidelines have had on MVCs in these countries. Although general standards for advertising in the United States and Canada exist, neither the automotive nor television industries in either country have specific guidelines on automobile commercial content, including the depiction of potentially dangerous behaviour, such as speeding. In contrast, the advertisement of other adverse health behaviours, such as tobacco and alcohol use, is limited by either voluntary codes of conduct or legislation.\textsuperscript{16–19}

Previous public health research has established the importance of examining risky health behaviours depicted in the mass media. For example, studies of tobacco and alcohol use have demonstrated a high prevalence of tobacco and alcohol use in films,\textsuperscript{20–25} as well as the targeting of children and adolescents in advertising.\textsuperscript{26–31} In the area of child nutrition and obesity, food commercials aired during children’s television programs have been analysed to reveal the poor nutritional content of advertised food products.\textsuperscript{32,33}

We set out to determine the extent to which unsafe driving behaviour is depicted in North American automobile advertising. In addition, the extent to which safety promotion and written disclaimers are utilized was assessed. A high prevalence of aggressive driving in automobile commercials would provide rationale for future studies to evaluate the degree to which this advertising affects consumer-driving behaviour.

**Methods**

**Television commercial acquisition**

We purchased (Video Monitoring Services, Detroit, MI, USA, and Nielsen Media Research, Markham, Ontario, Canada) all English-language automobile and truck commercials that were at least 30 seconds long and that were aired nationally on major broadcast and cable networks in either the United States or Canada during the months of January and July from 1998 to 2002, inclusive. The months of January and July were chosen to determine if there were any seasonal differences in either the portrayal of safety features or aggressive driving.

**Television commercial analysis**

Data provided allowed us to code each commercial for the following variables before viewing: year and month that the commercial was initially aired on television, automaker, class and model of automobile. The automakers were classified as being North American, Asian or European. The automobile model’s most recent manufacturer’s suggested retail price as of November 2003 was obtained from each automaker’s website. Two of the authors (PS and JG) viewed each commercial at least twice to determine the presence of a driving sequence, defined as at least one scene of an automobile moving in a driving environment lasting for the total duration of at least 3 seconds. Commercials containing a driving sequence were then coded for the following: the presence and type of safety promotion, the presence of a written disclaimer during a driving sequence, the duration of any written disclaimer, the sex of the driver and the narrator of the commercial. A handheld digital stopwatch was used for relevant data measurements.

In conjunction with Toronto Police Traffic Services and critical care physicians working at our institution, we developed a standardized evaluation form containing a list of unsafe driving activities. We classified the type of unsafe driving activities into four domains: aggressive driving (including speed violations), inattentive driving, failure to use safety equipment and miscellaneous traffic violations (Table 1). We then asked three raters who were not involved in the study design to independently view the commercials. The raters were university-educated summer students (one female and two males) who were not involved in the design of the study. They were told that the purpose of the study was to assess the portrayal of driving behaviour and safety in automobile commercials. Each rater

<table>
<thead>
<tr>
<th>Aggressive driving</th>
<th>Inattentive driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess speed*</td>
<td>Cellular phone use</td>
</tr>
<tr>
<td>Excess acceleration*</td>
<td>Distracted by music</td>
</tr>
<tr>
<td>Excess speed relative to conditions*</td>
<td>Distracted by passenger(s)</td>
</tr>
<tr>
<td>Glamorization of speed*</td>
<td>Distracted by pedestrian(s)/surroundings</td>
</tr>
<tr>
<td>Racing*</td>
<td></td>
</tr>
<tr>
<td>High-speed cornering*</td>
<td></td>
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<tr>
<td>Risky off-road driving</td>
<td></td>
</tr>
<tr>
<td>Skidding</td>
<td></td>
</tr>
<tr>
<td>Sudden breaking</td>
<td></td>
</tr>
<tr>
<td>Tailgating</td>
<td></td>
</tr>
<tr>
<td>Improper use of safety features</td>
<td>Miscellaneous traffic violations</td>
</tr>
<tr>
<td>No seat belt</td>
<td>Failure to signal lane change/turn</td>
</tr>
<tr>
<td>No headlights for night driving/poor visibility</td>
<td>Failure to obey traffic sign/signal</td>
</tr>
<tr>
<td>No child-safety seats</td>
<td>Failure to yield to pedestrian</td>
</tr>
</tbody>
</table>

*These violations were considered speed violations.
received a 2-h training session before viewing the commercials. During this training session, the raters were familiarized with the standardized evaluation form. They were shown 10 commercials not used in the subsequent analysis to allow them the opportunity to practice completing the forms. For each of the 10 commercials used in the training session, as well as the set of commercials used in this study, the raters were asked to evaluate each commercial containing a driving sequence for the presence and type of unsafe driving activity. Raters were also specifically requested to document, if they felt that a commercial displayed a car at high speed. The raters were instructed to consider high-speed cornering, fast acceleration, skidding, as well as the effect of speed produced when the frame rate was accelerated in the commercial. We cautioned them not to consider trivial infractions or activities and not code driving as aggressive when it was used in the context of demonstrating a safety feature (such as braking or evasive manoeuvres). We allowed the raters to use their individual judgment as to the presence of speeding or a driving infraction so as to minimize the effect of our bias from on their decisions. The selected commercials were then independently viewed by each rater in random order as determined by a random number generator so that the raters were unaware of the year and month of the commercial.

A commercial was defined a priori as having an unsafe driving activity when at least two of the three raters agreed on the presence of a driving violation. Similarly, the coding of the type of unsafe activity required the agreement of at least two raters. For the coding of unsafe driving activity, we calculated an inter-rater reliability between pairs of observers and also had the raters re-evaluate a random 10 per cent of the commercials to determine intra-rater reliability.

Statistical analysis
Data was analysed using the SAS system version 8.02 for Windows (SAS Institute Inc., Cary, NC, USA). Inter- and intra-rater agreement and the corresponding 95 per cent confidence limits were assessed by using overall agreement and Cohen’s Kappa statistic. We interpreted Kappa values as follows: <0.20, ‘poor’; 0.21–0.40, ‘fair’; 0.41–0.60, ‘moderate’; 0.61–0.80, ‘good’; and 0.81–1.00, ‘very good’.

For subgroup analyses, Fisher’s exact test was used to determine if there were associations between unsafe commercials and country, season of commercial, automaker (North American versus others) and sex of both the driver and narrator of the commercial. Univariable logistic regression was used to determine if there were any associations between unsafe commercials and the year of commercial, the manufacturer’s suggested retail price and the class of car. Forward, backward and stepwise methods were used to assess significant variables in the multivariable setting. A p-value of <0.05 was considered statistically significant.

Role of funding source
This study was funded by a grant from the Insurance Bureau of Canada. The granting agency had no part in the study design, in its operationalization or in the data analysis or interpretation.

Results
From 1998 to 2002, 349 different automobile commercials aired nationally in the United States or Canada in the months of January and July. Of these, 250 (71.6 per cent) contained a driving sequence greater than 3 seconds in duration and comprised the commercials used for subsequent analysis.

Prevalence of unsafe driving
Of the 250 commercials, 113 (45.2 per cent) contained at least one unsafe driving sequence as determined by two of three raters. The distribution of agreement among the raters is displayed in Fig. 1. Unanimous agreement (three of three raters) on the presence of an unsafe driving sequence was found in 69 (27.6 per cent) commercials. The inter-rater reliability among pairs of observers was 0.77, 0.77 and 0.71 with Kappa values of 0.54 (0.44, 0.65), 0.54 (0.44, 0.64) and 0.41 (0.31, 0.53), respectively. The respective intra-rater reliability of the presence of an unsafe driving sequence was 0.93, 0.86 and 0.86, with corresponding

Figure 1 Prevalence of unsafe driving in North American car commercials and distribution of agreement among raters.
Kappa values of 0.81 (0.57, 1.06), 0.73 (0.49, 0.97) and 0.72 (0.46, 0.97) for each rater.

Type of unsafe driving and multiple violations

There was an agreement about the type of unsafe driving activity by at least two raters in 105 driving sequences. Eighty-nine (84.8 per cent) of the 105 driving sequences were classified as demonstrating aggressive driving, 12 (11.4 per cent) demonstrated inattentive driving and 4 (3.8 per cent) had miscellaneous driving infractions (Fig. 2). No instance of improper use of safety equipment was documented. Thirty-four (13.6 per cent) of the 250 commercials contained multiple (≥2) violations.

Speed

A speed violation (Table 1) was summarized in 63 (25.2 per cent) commercials. Speed violations accounted for 60.0 per cent of driving violations (Fig. 2). Automobiles were shown at high speed in 146 (58.4 per cent) of commercials, and the power of the vehicle was mentioned in 58 (23.2 per cent).

Safety promotion and written disclaimers

A reference to safety promotion was documented in 30 (12.0 per cent) of the 250 commercials. The types of safety promotion identified were safety features (such as anti-lock brakes, airbags, traction control, all-wheel drive and so on) in 26 (86.7 per cent) commercials, reference to either crash-test ratings and/or safety awards in 3 (10.0 per cent), and miscellaneous safety promotion in 1 (3.3 per cent).

Written disclaimers indicating that driving sequences were filmed in controlled conditions or that professional drivers performed the driving were found in 22 (8.8 per cent), sedan/midsize 48 (19.2 per cent), luxury/large 32 (12.8 per cent), light truck 24 (9.6 per cent), minivan 9 (3.6 per cent), sport-utility vehicle (SUV) 67 (26.8 per cent) and sports car 11 (4.4 per cent). Thirty-seven (14.8 per cent) commercials featured more than one class of car and were thus excluded from this analysis. In our sample, the mean price of car in the commercials that we evaluated was $26 259 (Canadian funds), and the median price was $22 635. There was no association between price of car and the prevalence of unsafe driving.

Multivariable logistic regression analysis did not yield any significant associations between unsafe driving and any of the variables.

Differences between the sexes

Of 141 commercials in which the sex of the driver(s) was shown, 115 (81.6 per cent) were male drivers, 18 (12.8 per cent) female and 8 (5.7 per cent) had drivers of both sex. Comparing commercials with either male or female drivers, there was no significant association between the sex of the driver and unsafe driving. Of 221 commercials with narrators, 186 (84.2 per cent) had male narrators, 30 (13.6 per cent) female and 5 (2.3 per cent) contained voices of both sexes.
Discussion

Main finding of this study

Our study demonstrates a high prevalence of unsafe driving activities in US and Canadian automobile commercials. In contrast to the high prevalence of aggressive driving, we observed a low prevalence of safety promotion in automobile commercials.

What is already known on this topic?

Although the portrayal of aggressive driving has been cited as a concern by several consumer and safety organizations, only one previous study has evaluated the content of automobile commercials. In a report published by the Insurance Institute for Highway Safety, Ferguson et al.35 analysed how car and passenger vans were being portrayed in automobile manufacturer advertisements in the year 1998 and over time by sampling approximately 100 commercials in the years 1983, 1988 and 1993. Performance (speed, power and manoeuvrability) was identified as the primary theme in 17 per cent of the advertisements in 1998 and was the most prevalent theme over time. Although the authors reported that performance was mentioned and/or profiled in nearly half of all commercials, it is unclear whether the advertisements portrayed risky driving behaviour. Similar to our study, they commented on a relatively infrequent theme of safety in commercials, with safety being the primary theme in 2–7 per cent of commercials. It is difficult to draw comparisons between this report and our own, owing to differences in terminology; however it would seem that there is general agreement as to the focus of automobile manufacturers, namely to utilize the performance features of vehicles as opposed to safety features in selling automobiles.

Table 2 Distribution of commercials and prevalence of unsafe commercials by subgroup (country, year, season, automaker, class of car and gender of driver)

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Total number of commercials (N)</th>
<th>Number of unsafe commercials (%) (n)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>184</td>
<td>85 (46.2)</td>
<td>0.67</td>
</tr>
<tr>
<td>Canada</td>
<td>66</td>
<td>28 (42.4)</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>40</td>
<td>15 (37.5)</td>
<td>0.40</td>
</tr>
<tr>
<td>1999</td>
<td>59</td>
<td>30 (50.8)</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>48</td>
<td>19 (39.6)</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>61</td>
<td>32 (52.5)</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>42</td>
<td>17 (40.5)</td>
<td></td>
</tr>
<tr>
<td>Season</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>157</td>
<td>68 (43.3)</td>
<td>0.51</td>
</tr>
<tr>
<td>July</td>
<td>93</td>
<td>45 (48.4)</td>
<td></td>
</tr>
<tr>
<td>Automaker</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North American*</td>
<td>129</td>
<td>45 (34.5)</td>
<td>0.0009†</td>
</tr>
<tr>
<td>European‡</td>
<td>53</td>
<td>28 (52.8)</td>
<td></td>
</tr>
<tr>
<td>Asian§</td>
<td>68</td>
<td>40 (58.8)</td>
<td></td>
</tr>
<tr>
<td>Class of car</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economy/small</td>
<td>22</td>
<td>10 (45.5)</td>
<td>0.54</td>
</tr>
<tr>
<td>Sedan/midsized</td>
<td>48</td>
<td>20 (41.7)</td>
<td></td>
</tr>
<tr>
<td>Luxury/large</td>
<td>32</td>
<td>17 (53.1)</td>
<td></td>
</tr>
<tr>
<td>Minivan/Wagon</td>
<td>9</td>
<td>4 (44.4)</td>
<td></td>
</tr>
<tr>
<td>Sport-utility vehicle</td>
<td>67</td>
<td>25 (37.3)</td>
<td></td>
</tr>
<tr>
<td>Sports</td>
<td>11</td>
<td>7 (63.6)</td>
<td></td>
</tr>
<tr>
<td>Light truck</td>
<td>24</td>
<td>13 (54.2)</td>
<td></td>
</tr>
<tr>
<td>Multiple/other</td>
<td>37</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Gender of driver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>115</td>
<td>58 (50.4)</td>
<td>0.80</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>8 (44.4)</td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>8</td>
<td>5 (62.5)</td>
<td></td>
</tr>
<tr>
<td>Not shown</td>
<td>109</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

*North American automakers consisted of (number of commercials in parentheses) General Motors (66) – including GM/GMC (9), Buick (8), Cadillac (11), Chevrolet (12), Oldsmobile (6), Pontiac (17) and Saturn (3); Ford (33) – including Ford (19), Lincoln (9) and Mercury (6); and Chrysler (30) – including Chrysler (15), Dodge (8) and Jeep (7).
†Compares North American versus others.
‡European automakers consisted of Audi (11), BMW (6), Jaguar (3), Land Rover (6), Porsche (1), Volkswagen (15) and Volvo (7).
§Asian automakers consisted of Honda (19) – including Honda (6) and Acura (9); Hyundai (1); Isuzu (3); Kia (2); Mazda (4); Mitsubishi (7); Nissan (8) – including Nissan (7) and Infiniti (1); Subaru (4); Suzuki (5); and Toyota (19) – including Toyota (16) and Lexus (3).
||Compares males versus females.
What this study adds?

Our study expands upon earlier findings and systematically evaluated the prevalence of unsafe driving in automobile commercials. The majority of these activities are related to the portrayal of aggressive-driving, with most of the aggressive-driving activities involving speed. The portrayal of speeding in these commercials is especially concerning, given that excessive speed is a factor in approximately 30 per cent of both MVCs and motor-vehicle fatalities.1 Speed and power were the features promoted in the majority of commercials that we evaluated, suggesting that automakers stress these attributes of their products, and not safety features, to prospective automobile buyers. We were also surprised about the relatively low prevalence of written disclaimers in commercials that displayed unsafe or aggressive driving behaviour. Furthermore, it was our observation that disclaimers were displayed in small font across the bottom of the television screen. They were often legible only on repeated viewing, a convenience not afforded to casual viewers of commercials.

The lower prevalence of unsafe driving activities in commercials by North American versus Asian or European automakers is an interesting finding, but our analysis was based on a historical breakdown of automakers. We did not consider the current status of automaker mergers (e.g. Daimler–Chrysler) that blur traditional concepts of domestic versus foreign automobiles. Furthermore, the small number of commercials per individual automaker did not allow us to make a more detailed analysis by automaker.

We observed no significant difference in the prevalence of unsafe driving activities when analysed by country in which the commercial was aired, year, season, class of car, sex of either the driver or the narrator or price of car. There are several possible interpretations of this finding. One possibility is that the number of commercials per subgroup may have been insufficient to detect a difference between classes of automobile or gender of the driver. For example, the small number of commercials containing exclusively female drivers made it difficult to identify any gender differences. Nonetheless, the data suggest that our finding of a high prevalence of unsafe driving is generalizable to most automobile commercials.

In addition to the overwhelming majority of male drivers, we also found that the gender of the voiceover in these commercials was almost exclusively male. Although one interpretation is that this gender discrepancy reflects gender bias in the advertising industry, we believe that this finding suggests that young males are the demographic group targeted in these commercials. Although we did not attempt to quantify the age of the drivers, it has been previously observed that elderly drivers are underrepresented in advertisements for automobiles.36 It is our concern that young male drivers targeted by automobile commercials are the same demographic group that demonstrates increased risk-taking behaviour and is involved in 70 per cent of driver deaths in North America.11,37

Limitations

The evaluation of a driving sequence as unsafe has a subjective element because of varying individual thresholds. The prevalence of unsafe driving is thus dependent on the threshold of the raters assessing the commercials. We also chose to avoid the use of ‘expert’ raters, such as police officers or driving instructors. We felt that the impressions of novice consumers were more relevant. We attempted to minimize the degree of subjectivity in scoring according to specific definitions of what constituted an unsafe driving activity. The degree of subjectivity was also addressed through the use of three independent raters who were not involved in the study design and by mandating that at least two of the three raters had to agree upon the presence of an unsafe activity. The acceptable level of inter-rater reliability and the high intra-rater reliability reassured us that there was reasonable consistency in the interpretation of the content of the commercials by each rater. Even when one applies a stricter criterion of unanimous agreement among raters, over one in four commercials contained an unsafe driving activity. In our view, this remains an unacceptably high portrayal of unsafe driving activity.

It is important to emphasize that our study does not provide any evidence that there is a correlation between unsafe driving activity in automobile commercials and MVCs or motor-vehicle deaths. We do know, however, that there is at least modest evidence from tobacco, alcohol and child nutrition research, including a prospective study, that suggests a correlation between exposure to advertising and increased adverse health behaviours.28,30,38,41 This study is also limited to an analysis of one medium and, by design, focused only on automobile advertisements. It would be more far reaching to establish a similarly high prevalence of unsafe driving activities in non-commercial driving sequences in television programs and film, as well as to study the content of print, radio and Internet advertisements. We also only evaluated the content of Canadian and American commercials. It would be interesting to contrast the content of these commercials with the content of commercials from other countries to determine the potential influence of regulatory bodies, such as the recently consolidated governance that regulates broadcasting in the United Kingdom, Office of Communication (Ofcom).

In conclusion, our study establishes a high prevalence of unsafe driving in automobile commercials aired in North America and identifies this issue as a remediable public health concern. It remains unclear whether the portrayal of such activities in automobile commercials translates into actual driving behaviour or to what end it contributes to MVCs. However, we strongly believe that automakers should demonstrate the use of their products within the confines of existing laws and in a safe fashion. Both the Canadian and American codes of advertising adhere to the principle that ‘advertisements must not without reason, justifiable on educational or social grounds, display a disregard for safety by depicting situations that might reasonably
be interpreted as encouraging unsafe or dangerous practices, or acts’. That motor-vehicle accidents represent a significant public health and economic concern, further investigation into the influence of driving behaviour, as portrayed in automobile commercials, on consumer-driving behaviour or attitudes is warranted.

Acknowledgements

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