

DRIVING BEHAVIOR AMONG MEDICAL STUDENTS

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Study conducted at the Ribeirão Preto School of Medicine of Universidade de São Paulo, São Paulo, SP, Brazil.

ABSTRACT

OBJECTIVE. To study the driving behavior of medical students, comparing current patterns with those found in a study previously conducted at the same school of medicine.

METHODS. We administered standardized questionnaires to a sample of students enrolled at the medicine major of the Ribeirão Preto School of Medicine, Universidade de São Paulo (USP), in order to collect demographic and socioeconomic data, as well as information on their driving behavior and involvement in traffic accidents. Our findings were compared with those found in a similar study conducted in 1997.

RESULTS. We included 354 students in the present study conducted in 2008. The sample of the study conducted in 1997 included 377 students. Of the total number of participants, 431 (59%) had driven after drinking alcohol, and of these, 21.5% had consumed large amounts of alcohol. Participation in illegal street racing was reported by 10.5% of the participants, with significant difference between sexes (12.5% of men and 3.4% of women). Involvement in accidents with fatal or non-fatal casualties was reported by 19.2% of the participants. These percentages reached 31.1% among those who have already driven while being heavily intoxicated and 42.9% among those who participated in illegal street racing. The 2008 study showed higher use of helmets and seat belts in urban areas and reduced use of alcohol before driving. On the other hand, the same study showed an increased disrespect for traffic lights.

CONCLUSION. Driving risk behaviors were always highly frequent among the participants, being directly related to involvement in accidents with casualties. Since this sample includes a privileged portion of the population, which is aware of and has direct contact with the consequences of such accidents, we expected lower rates of high-risk behaviors. Our findings may lead the academic community to consider the implementation of educational programs that can effectively change students' behavior.

KEY WORDS: Traffic accidents. Medical students. Risk acceptance.

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INTRODUCTION

Traffic accidents have been the focus of social concern in the world. It is estimated that 1.2 million people died as a consequence of traffic accidents in 2000, and that the number of individuals who had injuries was 10 times higher than that¹. In Brazil, traffic accidents and violence are the second leading cause of death. However, within the age group between 5 and 39 years, these events are the leading cause of death, with traffic homicides and accidents being the major factors responsible for this situation².

This large number of accidents has a relevant economic impact because it is the first cause of death among the most economically productive population group, also leading to a large number of hospitalizations and hospital care².

Because young people are the most vulnerable to being involved in traffic accidents, it is extremely important to study the frequency of risk behaviors in this relevant population

group. Unfortunately, there are few studies in the literature on this topic, which limits the amount of information that can support the preparation of prevention programs^{3,4}. Particularly with regard to Brazil, this shortage of studies is even more prominent, especially in terms of research addressing health students². The objective of the present study is to investigate the driving behavior of medical students, trying to quantify their involvement in risk situations and car accidents. In addition, another objective of this study is to compare the current status with the one observed in 1997, when a similar study was conducted among medical students from the same school of medicine. Thus, we intend to evaluate whether the changes made to the legislation with the implementation of the new Brazilian Traffic Code were effective in changing driving behaviors and reducing accidents in the population studied, similarly to what has happened in some other countries^{5,6}.

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METHODS

Standardized self-administered questionnaires were applied to a sample of 354 students enrolled in 2008 at the Ribeirão Preto School of Medicine to collect demographic and socioeconomic data, as well as information related to their driving behavior and involvement in traffic accidents.

Our findings were compared with those found in a similar study conducted in 1997. The questionnaires used in both studies were very similar. The only difference was that the instrument used in 2008 included the variable "fines received", which was not investigated in 1997.

In both studies, we tried to include as many participants as possible. After asking for the teacher's permission, the questionnaires were administered at the beginning of a lesson to the students who were present in the classroom and who agreed to participate by signing a written consent form. The questionnaires were completed anonymously. The only personal data required were related to the variables sex, age, and medical school year. The mean completion time was 10 minutes.

This project was approved by the Research Ethics Committee of Hospital das Clínicas, Ribeirão Preto School of Medicine, and conducted with the prior agreement of the Undergraduate Committee of the Ribeirão Preto School of Medicine.

Because the variables used in the present study are qualitative or stratified quantitative, the associations between them were investigated using the chi-square test and Fisher's exact test.

RESULTS

The School of Medicine of the Universidade de São Paulo in Ribeirão Preto has approximately 100 students enrolled in each academic year, totaling approximately 600 students. Of these, 377 were included in the 1997 study and 354 in the 2008 study, representing, respectively, 62.8% and 59.0% of all students enrolled in both years of study. The main reason for non-participation was related to the students' diversified activities in certain periods, making it difficult to approach them during the study period. This fact explains the lack of students from the 5th year in the 1997 study, as well as the smaller number of students from some years (2nd, 4th, and 5th years) in 2008. Refusals represented less than 1% of the losses.

As shown in Table 1, the 2008 study demonstrated an increase in the participation of females and students aged 22 years or older, as well as a larger number of students enrolled in the last academic years. We also found an increased popularity of mobile phones, which were owned by 96.9% of the participants in 2008.

According to Table 2, the 2008 study showed a significant increase in urban use of seat belts and helmets. On the other hand, there was also a significant reduction in the practice of driving after drinking alcohol and in the continuous respect for traffic lights. However, consumption of large amounts of alcohol before driving was reported by 74 students in 1997 (31.2%), and 61 in 2008 (31.4%), with no difference

between the periods. Although it showed a small reduction in 2008, exceeding speed limits was present in almost 30% of the participants.

Participation in illegal street racing was reported by 12.3% in 1997 and by 8.6% in 2008 ($p > 0.05$). Although we did not include such data in our tables, this practice was widely prevalent among men (12.5% versus 3.4% of women in the whole sample, $p < 0.001$). In spite of the fact that there was no significant reduction in the number of participants involved in accidents with casualties (21% and 17.2%, respectively), we found a decrease in the severity of these accidents, as reflected by the lower percentage of deaths and need of hospitalization.

Considering those students who were involved in accidents with fatal and non-fatal casualties (Table 3) while driving cars, we found a very similar percentage between sexes in the 1997 study. On the other hand, there was a marked predominance of men in 2008 (21.5% vs. 13.6%), which was caused by the decrease in the occurrences among women. Individuals who consumed alcohol before driving showed significantly larger numbers of involvement in accidents with casualties in both studies, with percentages 2.1 and 2.5 times higher when compared with those who did not consume alcohol, respectively, in 1997 and 2008. The same trend was observed for cases of non-compliance with speed limits and disrespect for traffic lights. Both studies showed a trend to higher rates of accidents among those who disobeyed the rules, especially in situations where it occurred regularly. Of all risk situations, participation in illegal street racing demonstrated the highest percentage of accidents, with values of 40.9% and 46.2% in 1997 and 2008, respectively.

Traffic fines were reported by 147 participants in 2008, having 254 different reasons (data not shown). Of these fines, 72.4% were related to behaviors that increase the risk of accidents, namely: speeding, red light violation, cell phone use, failure to use a seatbelt, overtaking in a no overtaking zone, problems with the vehicle, driving towards a forbidden direction, and driving with headlights off at night.

DISCUSSION

Periodically repeated cross-sectional studies offer the possibility of monitoring trends and measuring the possible effects of interventions implemented over time. The present study allows us to compare some of the behaviors of medical students before and after the implementation of the new 1998 Brazilian Traffic Code. The impact of this measure was clearly felt in the generalization of the urban use of seat belts and helmets. These procedures were reported as constant practices with percentages above 90% in the 2008 study, showing a clear difference regarding the finding of the 1997 study. Unfortunately, the questionnaire used in the present study did not include questions about the use of seat belts in the back seat of vehicles, making it impossible to obtain this relevant information, a practice that does not seem to be so intense among the general population. Respect for traffic lights showed a statistically significant difference between the two studies, which occurred as a result of the decrease in the percentages that reported constant obedience and a consequent increase in the percentage of frequent but not

Table 1 - Distribution of participants according to some general characteristics and period of undergraduate program

Variable	Categories	1997 Study		2008 Study	
		n	%	n	%
Sex	Male	269	71.4	219	61.9
	Female	108	28.6	135	38.1
Age	17 to 18 years	37	9.8	25	7.1
	19 to 21 years	170	45.1	114	32.2
	22 or older	160	42.4	212	59.9
	Unanswered	10	2.7	3	0.8
Year in the undergraduate program	1st	76	20.2	82	23.2
	2nd	77	20.4	21	5.9
	3rd	70	18.6	87	24.6
	4th	81	21.5	47	13.3
	5th	0	0.0	39	11.0
	6th	73	19.4	78	22.0
Has mobile phone	Yes	81	21.5	343	96.9
	No	294	78.0	2	0.6
	Unanswered	2	0.5	9	2.5

permanent respect. This fact might be connected to a recent increased perception of insecurity when stopping at traffic lights located in remote places and at late hours.

Although it kept very high in the second study (54.8%), we also found a significant reduction in the number of individuals who reported having driven after drinking alcohol. However, there was no reduction in the number of those who drove after consuming large amounts of alcohol, suggesting that the law does not seem to have produced significant impact on those who put themselves at higher risk for traffic accidents.

Several studies in the medical literature have sought more concrete associations between driver behavior and its relation to motor vehicle accidents. The high incidence of young victims around the world has been mainly related to differences between individuals of this age group and the older population.⁷ As aggravating factors that increase the risk of accidents, youths tend to have less experience driving, greater impulsivity, need of standing out within their group, higher consumption of alcohol and drugs, and are more likely to exceed speed limits and disobey traffic rules.^{2,7-11} However, a recent study conducted in Australia suggests that

among young drivers there appear to be two distinct groups of individuals: those at low and high risk of involvement in traffic accidents, which are different from each other according to behavioral factors related temperament and adjustment of their interpersonal relationships.³ Perhaps this is one possible explanation for the finding that, in the present study, the overall reduction of alcohol consumption was not accompanied by a decrease in the percentage of those who consume excessive amounts of alcohol.

However, we may expect that the increased level of education would help to reduce exposure to risk situations, particularly among medical students, since their educational process includes internships that put them in direct contact with victims of all sorts of violence. This is particularly true for students of the Ribeirão Preto School of Medicine, since its university hospital has an Emergency Room (ER) that is a tertiary referral care center for trauma and represents the main gateway of such occurrences for the whole region of Ribeirão Preto. Although the most intense exposure of medical students to trauma patients takes place in the last years of medical school, they have some degree of contact with the ER since

Table 2 - Distribution of participants according to some traffic related variables investigated in the studies conducted in 1997 and 2008

Variable	Categories	1997 Study		Estudo de 2008		p
		n	%	n	%	
Use of seat belt in the urban area	Always	249	66.0	323	91.2	<0.001
	Sometimes/Never	128	33.9	31	8.8	
	Total	377	100.0	354	100.0	
Use of helmet in the urban area	Always	29	59.1	85	95.5	<0.001
	Sometimes	25	42.4	4	4.5	
	Never	5	8.5	0	0.0	
	Total	59	100.0	89	100.0	
Respect for traffic lights	Always	87	24.2	34	11.2	<0.001
	Almost always	248	69.1	259	85.8	
	Sometimes/Never/Ignored	24	6.6	9	3.0	
	Total	359	100.0	302	100.0	
Obey speed limits	Always	39	10.9	37	12.1	0.014
	Almost always	191	53.3	181	59.3	
	Sometimes/Never/Other	128	35.7	87	28.6	
	Total	358	100.0	305	100.0	
Driving after drinking alcohol	Yes	237	62.9	194	54.8	0.026
	No/Ignored	140	37.1	160	45.2	
	Total	377	100.0	354	100	
Driving after consuming large amounts of alcohol	Once	38	16.0	23	11.9	0.284
	Twice or more	36	15.2	38	19.6	
	No/Ignored	163	68.7	133	68.6	
	Total	237	100.0	194	100.0	
Participation in illegal street racing	Once	16	4.5	12	4.0	0.232
	Twice or more	28	7.8	14	4.6	
	No/Ignored	315	87.8	276	91.4	
	Total	359	100.0	302	100.0	
Involvement in accidents with casualties	Yes	79	21.0	61	17.2	0.201
	No/Ignored	298	79.1	293	82.7	
	Total	377	100.0	354	100.0	
In the affirmative cases, the victims had injuries that:	Required hospital admission	16	20.3	8	13.1	0.250
	Did not require hospital admission	57	72.2	49	80.3	
	Caused death	2	2.5	1	1.6	
	Unknown answer	4	5.1	3	4.9	
	Total	79	100.0	61	100.0	

the early years of the undergraduate program, during a course that teaches the basics of caring for victims of accidents. The alarming frequency of risk behaviors among these young people, however, clearly demonstrates that the mere exposure to trauma victims does not seem to be enough to make them adopt safe practices in relation to traffic.

Two findings are particularly disturbing: the first one refers to the fact that approximately one fifth of the participants (21% in 1997 and 17.2% in 2008) was involved in traffic accidents that resulted in injuries to a vehicle passenger, even though this is a very young population with a mean age of 22

years. The second finding of concern relates to participation in illegal street racing reported by 12.3% in 1997 and by 8.6% in 2008, involving almost exclusively males. Intuitively, one could infer that both findings may be a consequence of the high rates of heavy consumption of alcohol before driving reported by approximately 30% of the participants in both studies. Indeed, it is difficult to imagine that a sober individual can engage in a clearly risky activity as the participation in illegal street racing, even if he/she is young and naturally more prone to practices that put them at a higher risk. Unfortunately, excessive consumption of alcoholic beverages is

Table 3 - Distribution of participants according to involvement in traffic accidents with (fatal or non-fatal) casualties when driving cars in 1997 and 2008, according to sex and some risk behaviors

Variables	Categories	Involvement in accidents with casualties									
		1997 Study					2008 Study				
		Yes		No		p	Yes		No		p
n	%	n	%	n	%		n	%			
Sex	Female	20	19.8	81	80.2	0.691	14	13.6	89	86.4	0.095
	Male	56	21.7	202	78.2		42	21.5	153	78.5	
Driving after drinking alcohol	No	15	12.3	107	87.7	0.003	10	9.4	95	89.6	0.003
	Yes	61	25.7	176	74.3		46	23.8	147	76.2	
Obey speed limits	Always	3	7.7	36	92.3	0.050	5	13.5	32	86.5	0.245
	Almost always	40	20.9	151	79.1		31	17.2	149	82.8	
	Sometimes/Never	33	26.0	94	74.0		20	24.7	61	75.3	
Respect for traffic lights	Always	15	17.2	72	82.8	0.310	7	21.2	26	78.8	0.475
	Almost always	54	21.8	194	78.2		46	18.0	210	82.0	
	Sometimes/Never	7	31.8	15	68.2		3	33.3	6	66.7	
Participation in illegal street racing	No	58	18.5	257	81.5	<0.001	44	16.2	228	83.8	<0.001
	Yes	18	40.9	26	59.1		12	46.2	14	53.8	

a frequent characteristic in student populations, making it frequently present among medical students.¹² In both studies, when investigating only those who had accidents, we found a strong association with participation in illegal street racing and drinking alcohol before driving, confirming the relevance of these variables as predisposing factors to involvement in accidents.

A possible higher susceptibility of medical students to risky driving behaviors is a provocative issue. Unfortunately, the almost complete absence of studies on behavioral aspects regarding driving in young populations – represented by non-medical students – makes comparisons more difficult. This issue is open and relevant enough to deserve the attention in future studies planned to be conducted involving students from other majors at the Campus of Ribeirão Preto, Universidade de São Paulo. The high rates of risk behaviors found in this study should lead to a debate conducted by the academic community. There is urgent need of a broad discussion that leads to the search of options that have an impact on the students' behaviors related to traffic. Even simple, short-term and inexpensive prevention programs, such as distribution of leaflets and posters using the students' help, can provide positive results.¹³ One example is the Project Pense Bem, an initiative of the Brazilian Society of Neurosurgery, based on the U.S. project ThinkFirst, implemented in Maringá (state of Paraná). By involving different population groups, this project caused a reduction in the severity of traffic accidents, which is expressed by decreased average length of hospital stay, mortality, and hospital costs.¹⁴ Lower rates of involvement in motor vehicle accidents has also been reported among

teenagers from Toronto who participated in the PARTY Program (Prevention of Alcohol Related Trauma in Youth), focused on injury prevention, with emphasis on traffic accidents (personal communication).

As a first initiative to raise the debate among students of the Ribeirão Preto School of Medicine, the topic epidemiology of traffic accidents was included in the syllabus of a compulsory course in the curriculum (Preventive Medicine), which was taught to medical students enrolled in the 8th semester. During the course, the findings of the present study are also discussed with the purpose of leading the students to perceive and critically analyze their own risks.

The results of the present study also reinforce the urgent need for the effective implementation of the law forbidding alcohol consumption by drivers. This law must be unconditionally supported by health professionals because its initial results were very favorable despite evidence of an undesirable weak control.¹⁵

Evidence obtained all around the world suggests that the human factor is primarily responsible for the occurrence of traffic accidents. However, the role played by other variables cannot be disregarded, such as road and vehicle conditions, which may increase the consequences of human failure.¹⁶ Investigations on the set of determinants of traffic accidents, emphasizing the aspects related to the driver, are rare in Brazil and deserve greater attention from health authorities.

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