Professional experience and traffic accidents/near-miss accidents among truck drivers

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ABSTRACT

Aim: To investigate the relationship between the time working as a truck driver and the report of involvement in traffic accidents or near-miss accidents.

Methods: A cross-sectional study was performed with truck drivers transporting products from the Brazilian grain harvest to the Port of Paranaguá, Paraná, Brazil. The drivers were interviewed regarding sociodemographic characteristics, working conditions, behavior in traffic and involvement in accidents or near-miss accidents in the previous 12 months. Subsequently, the participants answered a self-applied questionnaire on substance use. The time of professional experience as drivers was categorized in tertiles. Statistical analyses were performed through the construction of models adjusted by multinomial regression to assess the relationship between the length of experience as a truck driver and the involvement in accidents or near-miss accidents.

Results: This study included 665 male drivers with an average age of 42.2 ($\pm$11.1) years. Among them, 7.2% and 41.7% of the drivers reported involvement in accidents and near-miss accidents, respectively. In fully adjusted analysis, the 3rd tertile of professional experience (>22 years) was shown to be inversely associated with involvement in accidents (odds ratio [OR] 0.29; 95% confidence interval [CI] 0.16-0.52) and near-miss accidents (OR 0.17; 95% CI 0.05-0.53). The 2nd tertile of professional experience (11–22 years) was inversely associated with involvement in accidents (OR 0.63; 95% CI 0.40-0.98).

Conclusions: An evident relationship was observed between longer professional experience and a reduction in reporting involvement in accidents and near-miss accidents, regardless of age, substance use, working conditions and behavior in traffic.

1. Introduction

Traffic accidents represent an important cause of morbidity and mortality worldwide (Mathers and Loncar, 2006). The situation is no different in Brazil, where deaths and injuries associated with traffic accidents overall and especially among the occupants of cargo vehicles have remained at high levels or even increased in recent years (Morais Neto et al., 2012; Waiselfisz, 2013). Traffic accidents involving trucks are more severe, particularly when they occur on roads where the speed of the vehicles tends to be higher (Andrade and Jorge, 2001; Who, 2004). The consequences of these events include post-traumatic stress (Cavalcante et al., 2009), trauma and death in addition to health services costs for the victims' families and society in general.

In addition to the physical condition of the vehicle, the behavior of truck drivers and their intense and irregular working hours (Souza et al., 2005a) may expose them to the risk of involvement in traffic accidents (Robb et al., 2008; Brodie et al., 2009; Williamson and Friswell, 2013). Driving experience also appears to be an important factor associated with involvement in accidents (Mullin et al., 2000; Mccartt et al., 2003, Jimenez-Moleon et al., 2004; Silva et al., 2012; Gulliver et al., 2013; Curry et al., 2015). A cross-sectional study in Brazil showed that younger motorcyclists had a higher frequency of reported accidents in the 12 months preceding the study (Silva et al., 2012). In Spain, a case-control study showed a decreasing trend in the risk of accidents with a longer time holding a driver's license in all age groups (Jimenez-Moleon et al., 2004). A cohort study performed in New Zealand on drivers who had

obtained a provisional driver's license indicated a lower risk of traffic accidents in the last quartile of time holding a driver's license (longer than 14 months) (Gulliver et al., 2013).

However, few studies have assessed the involvement of truck drivers in traffic accidents (Cavagioni and Pierin, 2010; Ulhoa et al., 2010; Catarino et al., 2013; Kircher and Andersson, 2013; Chen et al., 2015). In a study performed in Tanzania (Kircher and Andersson, 2013), approximately 40% of truck drivers were involved in at least one traffic accident during their professional career. In Portugal, 37% of truck drivers reported involvement in traffic accidents in the 5 years prior to the study (Catarino et al., 2013). In the United States, a study revealed that 2.6% of long-haul truck drivers had reported a truck crash within one year, and 24% had reported at least one near miss in the last seven days (Chen et al., 2015). In Brazil, one investigation showed that the percentage of truck drivers that reported involvement in accidents in the year preceding the study was 10.9% (Ulhoa et al., 2010), and another study reported that 35% were involved in accidents during the entire period of their employment as a professional driver (Cavagioni and Pierin, 2010).

We found only one report in the literature (a case-control study performed in Australia) that identified a relationship between a shorter period of experience as a truck driver and an increased occurrence of accidents (Stevenson et al., 2014). Thus, studies that evaluate this relationship by taking into account confounding factors are important and may represent the groundwork to confront these events. Therefore, the objective of the present study was to investigate the relationship between the time of experience as a truck driver and reports of involvement in traffic accidents or near-miss accidents.

2. Methods

This is a cross-sectional study involving truck drivers transporting products from the Brazilian grain harvest to the Port of Paranaguá, Paraná, Brazil. A pilot study was previously performed in the port to evaluate the logistics associated with data collection systematization, approaching the drivers and data collection.

Data were collected through interviews with truck drivers. During the interviews, socioeconomic and demographic information were obtained in addition to the driver's health status, life habits, professional characteristics and practices, sleep-related issues and involvement in traffic accidents or near-miss accidents. Subsequently, the drivers answered a self-applied questionnaire concerning the use of psychoactive substances. This questionnaire contained a list of psychoactive substances (in a language that was comprehensible for the drivers, defined after the pilot study), and the participants were asked to mark those that they had previously used.

Research collaborators were trained to conduct the present study, and a manual with all of the procedures used for data collection was provided. The sample size calculation was based on the expected prevalence of accidents and near-miss accidents among truck drivers in the previous 12 months: 10% (Ulhoa et al., 2010) and 40% (Catarino et al., 2013), respectively, with a frequency variation of 4% for accidents and 7% for near-miss accidents according to the category length of professional experience. We determined that it would be necessary to obtain information from a minimum of 594 participants assuming a 5% alpha and 20% beta error. An extra 10% was added to the estimated sample size to minimize the biases of potential losses and incomplete records, resulting in a requirement for interviews with 653 drivers. The single inclusion criterion was that drivers should report at least one year of experience.

The selection of drivers was performed by convenience sampling because the flow of vehicles and the manner in which vehicles were parked in the sorting yard of the Port of Paranaguá did not follow a predetermined order. Data collection took place in the screening area for seven consecutive days in July 2012 between 8:00 am and 6:00 pm as follows: two researchers stayed at a fixed collection point; three researchers circulated through the points where the drivers congregated to eat or to obtain products available at the sorting yard; and two researchers circulated through the sorting yard to perform the interviews of drivers who were in the parked vehicles.

The outcome analyzed in the present study was the report of involvement in truck accidents or near-miss accidents in the previous year. To identify involvement in accidents, the following question was applied to the driver: "*Were you involved in any traffic accidents while driving your truck during the last 12 months?*" Their involvement in near-miss accidents was identified with the following question: "*Were you nearly involved in any traffic accidents while driving your truck during the last 12 months?*" A near-miss accident is understood as the performance of an evasive maneuver by the driver to avoid a vehicle accident (Hanowski et al., 2007). All truck drivers were asked about involvement in near-miss accidents, even if they had reported accident involvement. The categorization of the dependent variable was performed as follows: *involvement in accidents* (drivers who were involved in accidents in the previous 12 months, regardless of involvement in near-miss accidents); *involvement in near-miss accidents* (drivers who were involved only in near-miss accidents); and *no involvement in accidents and/or near-miss accidents* (reference category). The independent variable was the length of experience as a truck driver, which was categorized in tertiles according to its distribution: less than eleven years (reference category), from eleven to twenty-two years, and over twenty-two years.

The adjustment variables were grouped into three blocks: **age group** (under 40 years or 40 years or more); **substance use** [excessive consumption of alcoholic beverages (yes; no) and consumption of psychoactive substances during employment (yes; no)]; and **professional characteristics** [type of truck (articulated; non-articulated), distance travelled from the last loading place (1000 km or less; above 1000 km), work shift (night only/mostly at night; night and day equally; day only/mostly during the day), drowsiness while driving (yes; no), overtaking in prohibited locations (frequent; not frequent), exceeding the speed of 110 km/h with the truck (frequent; not frequent), and driving while feeling tired (frequent; not frequent)]. A variable was considered *frequent* when the driver mentioned "almost all the time or always" and *non-frequent* when the driver mentioned "never, rarely or sometimes." Excessive consumption of alcoholic beverages was defined as binge drinking, i.e., when the driver reported consuming five or more (male) or four or more (female) alcoholic drinks on one occasion (during approximately two hours) in the last 30 days (NIAAA, 2005). Information on alcoholic beverage consumption was obtained according to the type and quantity and classified in standard-sized drinks. The truck driver's income was also considered as a variable of characterization (1 BRL was equal to US$ 0.50 according to the mean exchange rate during the data collection period).

The data were double-entered in a database created in the Epi Info® version 3.5.3 software. Next, the data were compared and discrepancies were corrected after consulting with the collection instruments. The data analysis was performed using the Statistical Package for the Social Sciences® (SPSS) version 19.0 software. The associations among the variables (adjustment-outcome and factor-outcome) were verified using Multinomial Logistic Regression, with Odds Ratios (OR) and 95% confidence intervals (95% CI) estimates. Initially, a non-adjusted analysis was performed, followed by multiple factor analysis with the inclusion of the adjustment variables by blocks (*age group*, followed by *substance use* and finally *professional*

Table 1
Characterization of the evaluated drivers according to their involvement in accidents or near-miss accidents.

Variables	Total (n = 665)		No involvement in accidents or near-miss accidents (n = 361; 54.3%)		Involvement in near-miss accidents (n = 256; 38.5%)		Involvement in accidents (n = 48; 7.2%)	
	n	%	n	%	n	%	n	%
Time working as a driver (years)								
1st Tertile (bellow eleven)	231	34.7	107	46.3	102	44.2	22	9.5
2nd Tertile (from eleven to twenty-two)	220	33.1	113	51.4	88	40.0	19	8.6
3rd Tertile (above twenty-two)	214	32.2	141	65.9	66	30.8	7	3.3
Age group (years)								
Below 40	310	46.6	159	51.3	124	40.0	27	8.7
40 or more	355	53.4	202	56.9	132	37.2	21	5.9
Excessive consumption of alcoholic beverages								
Yes	192	28.9	93	48.4	82	42.7	17	8.9
No	473	71.1	268	56.7	174	36.8	31	6.6
Consumption of psychoactive substances during employment								
Yes	340	51.1	168	49.4	148	43.5	24	7.1
No	325	48.9	193	59.4	108	33.2	24	7.4
Truck feature								
Articulated	427	64.2	223	52.2	173	40.5	31	7.3
Non-articulated	238	35.8	138	58.0	83	34.9	17	7.1
Distance travelled (km)								
1000 or less	433	65.1	244	56.4	155	35.8	34	7.9
Above 1000	232	34.9	117	50.4	101	43.5	14	6.0
Shift								
Night only/Mostly at night	42	6.3	22	52.4	13	31.0	7	16.7
Night and day equally	170	25.6	84	49.4	72	42.4	14	8.2
Day only/Mostly during the day	453	68.1	255	56.3	171	37.7	27	6.0
–								
Drowsiness while driving								
Yes	211	31.7	105	49.8	86	40.8	20	9.5
No	454	68.3	256	56.4	170	37.4	28	6.2
–								
Overtaking in prohibited places								
Not frequent	658	98.9	358	54.4	253	38.4	47	7.1
Frequent	7	1.1	3	42.9	3	42.9	1	14.3
Exceeding the speed of 110 km/h								
Not frequent	608	91.4	340	55.9	227	37.3	41	6.7
Frequent	57	8.6	21	36.8	29	50.9	7	12.3
Driving while feeling tired								
Not frequent	607	91.1	335	55.2	230	37.9	42	6.9
Frequent	58	8.9	26	44.8	24	44.8	6	10.3

characteristics) based on the progressive adjustment of models (i.e., the 1st model was adjusted by only the 1st block, the 2nd model by the 1st and the 2nd block, and the 3rd model was adjusted by all 3 blocks of adjustment variables). The linear trend *p-value* was also calculated for the relationship between factor (time of experience in years, continuous variable) and outcome (involvement in accidents). All adjustment variables were included in the models regardless of the significance level, based on evidence of their possible confounding effects on the main association. Interactions between the main independent variable (length of experience as a truck driver) and all adjustment variables were tested with the likelihood ratio test to compare the adjusted models with and without the interaction terms. A p-value <0.05 was considered statistically significant.

The present study was approved by the Research Ethics Committee of the Londrina State University (Universidade Estadual de Londrina-UEL). The surveyed drivers were informed of the main study objectives, i.e., to analyze the working conditions, lifestyle, health conditions, use of psychoactive substances, accident involvement and other factors affecting truck drivers. After signing an Informed Consent Form, they answered the questions with the developed instruments.

3. Results

Out of the 773 drivers approached, five drivers reported less than one year of occupation. Of the remaining 768 drivers, there were 103 losses (13.4%) (98 refusals and five withdrawals). Thus, this study included a total of 665 truck drivers. All of the truck drivers were male with an average age of 42.2 years (standard deviation [SD] = 11.1 years). Their average monthly income was R$ 2,932.52 (SD = R$ 1.957.44) with a range from R$ 800.00 to R$ 25,000.00. The average time working as a truck driver was 18.4 years (SD = 11.5) with a minimum of one year and a maximum of 57 years. Other features of the analyzed sample are presented in Table 1.

Among the drivers evaluated, ***48 drivers (7.2%; 95% CI 5.4–9.5)*** mentioned involvement in traffic accidents as truck drivers during the last 12 months. Involvement in near-miss accidents in the past year was reported by 41.7% of drivers (n = 277), where ***256 drivers (38.5%; 95% CI 34.8–42.3)*** reported that they were exclusively involved in near-miss accidents. The drivers who reported no involvement in accidents and/or near-miss accidents accounted for ***54.3% (95% CI 50.4–58.1) (n = 361)***.

The non-adjusted analysis showed that the highest tertile of length of experience was inversely associated with involvement in accidents and near-miss accidents. In this analysis, psychoactive

Table 2
Non-adjusted multinomial regression between the variables of interest and the involvement in accidents and near-miss accidents.

Variables	Involvement in near-miss accidents OR (95% CI)	Involvement in accidents OR (95% CI)
Time working as a driver (years), n (%)		
1st Tertile (bellow eleven)	1.00	1.00
2nd Tertile (from eleven to twenty-two)	0.82 (0.55–1.21)	0.82 (0.42–1.60)
3rd Tertile (above twenty-two)	0.49 (0.33–0.73)[***]	0.24 (0.10–0.59)[**]
Age group (years)		
Below 40	1.19 (0.87–1.65)	1.63 (0.89–3.00)
40 or more	1.00	1.00
Excessive consumption of alcoholic beverages		
Yes	1.36 (0.95–1.93)	1.58 (0.84–2.99)
No	1.00	1.00
Consumption of psychoactive substances during employment		
Yes	1.54 (1.14–2.17)[**]	1.15 (0.63–2.10)
No	1.00	1.00
Truck feature		
Articulated	1.29 (0.92–1.81)	1.13 (0.60–2.12)
Non-articulated	1.00	1.00
Distance travelled (km)		
1000 or less	1.00	1.00
Above 1000	1.36 (0.97–1.90)	0.86 (0.44–1.66)
Shift, n (%)		
Night only/Mostly at night	0.88 (0.43–1.80)	3.01 (1.18–7.68)[*]
Night and day equally	1.28 (0.88–1.85)	1.57 (0.79–3.14)
Day only/Mostly during the day	1.00	1.00
Drowsiness while driving, n (%)		
Yes	1.23 (0.87–1.74)	1.74 (0.94–3.23)
No	1.00	1.00
Overtaking in prohibited places, n (%)		
Not frequent	1.00	1.00
Frequent	1.42 (0.28–7.07)	2.54 (0.26–24.9)
Exceeding the speed of 110 km/h, n (%)		
Not frequent	1.00	1.00
Frequent	2.07 (1.15–3.72)[*]	2.76 (1.11–6.90)[*]
Driving while feeling tired, n (%)		
Not frequent	1.00	1.00
Frequent	1.46 (0.83–2.57)	1.84 (0.72–4.73)

[*] $p<0.05$.
[**] $p<0.01$.
[***] $p<0.001$.

Table 3
Adjusted multinomial regression between the time working as a driver and the involvement in accidents and near-miss accidents.

Variables	Time Working as a Driver			Linear trend p-value
	1st Tertile Bellow eleven years	2nd Tertile From eleven to twenty-two years	3rd Tertile Above twenty-two years	
Accidents				
Model 1	1.00	0.69 (0.45–1.05)	0.33 (0.19–0.57)[***]	<0.001
Model 2	1.00	0.64 (0.42–0.99)[*]	0.31 (0.18–0.55)[***]	<0.001
Model 3	1.00	0.63 (0.40–0.98)[*]	0.29 (0.16–0.52)[***]	<0.001
Near-Miss Accidents				
Model 1	1.00	0.70 (0.33–1.45)	0.17 (0.06–0.50)[**]	0.001
Model 2	1.00	0.68 (0.33–1.43)	0.16 (0.05–0.50)[**]	0.001
Model 3	1.00	0.76 (0.35–1.64)	0.17 (0.05–0.53)[**]	0.002

Model 1: adjusted by age group. Model 2: adjusted by age group plus excessive consumption of alcoholic beverages and psychoactive substances during employment. Model 3: variables of model 2 plus type of truck, distance from the last loading, work shift, drowsiness while driving, overtaking in prohibited locations, exceeding the speed of 110 km/h, and driving while feeling tired.

[*] $p < 0.05$.
[**] $p < 0.01$.
[***] $p < 0.001$.

substance use and the frequent practice of exceeding the speed of 110 km/h showed a significant association with involvement in near-miss accidents. Involvement in accidents was associated with driving predominantly at night and with the frequent practice of exceeding the speed of 110 km/h (Table 2).

Table 3 shows the association between the length of experience as a driver and accidents or near-miss accidents observed after the adjustments. Notably, the 3rd tertile of experience remained inversely associated with involvement in accidents (OR: 0.17; 95% CI: 0.05–0.53) and near-miss accidents (OR: 0.29; 95% CI:

0.16–0.52) after the addition of the adjustment variables. Moreover, after the inclusion of the adjustment variables excessive consumption of alcohol and psychoactive substance use during employment (Model 2), the 2nd tertile of experience exhibited a significant association with involvement in near-miss accidents and remained in Model 3 (OR: 0.63; 95% CI: 0.40–0.98). The latter analysis (Model 3) also showed that involvement in near-miss accidents was associated with drivers under 40 years of age (OR: 2.03; 95% CI: 1.24–3.29). Although it remained associated with involvement in near-miss accidents in Model 2, the consumption of psychoactive substances during employment lost statistical significance in Model 3 (adjustment by professional characteristics). The frequent practice of exceeding the speed of 110 km/h with the vehicle (accidents and near-miss accidents) and driving predominantly at night (accidents) lost statistical significance when included in the adjusted model (Model 3). No significant interactions were found between the length of experience as a truck driver and the adjustment variables (p-value for all likelihood ratio tests >0.05).

4. Discussion

The results of the present study showed that the length of experience as a truck driver was inversely associated with involvement in accidents and near-miss accidents even after adjustment for age, type of truck, substance use, professional characteristics and behavior in traffic. This result is similar to a case-control study performed in Australia, which reported that truck drivers with 10 years or more of driving experience with this type of vehicle showed a threefold lower probability of being involved in accidents (Stevenson et al., 2014). One possible explanation for this result is that more experienced drivers have a greater ability to drive heavy vehicles (articulated trucks) especially when empty due to the association with high speeds, which makes driving more difficult (Stein and Jones, 1988; Stevenson et al., 2014).

Thus, a possible strategy to reduce accidents or near-miss accidents among truck drivers would be to improve the training of truck drivers when they join the profession in both Brazil and other countries. In Brazil, the legislation for driving articulated semi-trailer trucks (Brasil, 1997) (the majority type in the present study) requires improvement. For instance, there are no specific mandatory courses to prepare these drivers, which contributes to the integration of professionals into the labor market without proper experience driving heavy vehicles. To obtain a license to drive articulated semi-trailer trucks, it is necessary to hold a vehicle driving license for only one year and a license for driving smaller trucks for another year (i.e., considering a minimum age of 18 years, a driver aged 20 years or more can become a driver of a large articulated truck) (Brasil, 1997). Furthermore, the practical tests are routinely performed on urban roads; thus, these tests do not reflect the reality of the truck driver, which usually involves driving on highways and at speeds higher than those allowed on urban streets. Thus, it is possible to suggest that the length of experience in this profession is what effectively qualifies the professional.

Although the rules for obtaining a license for commercial driving in the United States are the responsibilities of the states, overall, they are similar among states (FMCSA, 2015). For example, for a driver in the state of New Jersey to obtain a license to drive vehicles with characteristics similar to those of the present study, tests are required, in addition to a minimum age of 18 years, holding a basic license (Class D) and being physically fit for work as a commercial driver. The applicant must take a knowledge test and correctly choose at least 80% of the questions on traffic safety, mechanical and structural aspects of the vehicles, vehicle inspection and issues associated with driving of the vehicle. Then, the candidate needs to practice driving a truck for at least 10 days accompanied

by another driver with a commercial license. Only then will the candidate be able to perform the road test, which will be evaluated by a safety expert. The following aspects are evaluated during this road test: pre-trip inspection (to determine whether the driver knows whether the vehicle is safe to drive), basic control skills test (to evaluate basic skills in controlling the vehicle) and road test (to evaluate the ability to drive safely in a variety of on-the-road situations) (NJMVC, 2015). All of the aforementioned rules indicate that truck drivers in the United States are better prepared to practice the profession compared to truck drivers in Brazil. In other countries such as Canada (Commercial Vehicle Safety Alliance, 2015), the United Kingdom (Driving Standards Agency, 2012) and Australia (Northern Territory Government, 2015), the rigors required to obtain a "Commercial Driver's License" or "Heavy Vehicle Driver License" resemble those of the United States, although there are differences in the rules.

In the present study, we also observed that younger drivers reported an increased frequency of involvement in near-miss accidents but not in accidents after analysis adjustments for the length of experience as a driver and other characteristics. Studies with the drivers of other vehicles (Ryan et al., 1998; Mcgwin and Brown, 1999, Silva et al., 2012; La et al., 2013; Martinez-Ruiz et al., 2014) showed a relationship between younger ages and the risk of traffic accidents. It is possible that this relationship was not observed in the present study due to the low prevalence of accidents, which might have decreased the power of the study to detect this association. Nevertheless, it should be noted that younger individuals may exhibit high-risk driving behaviors and are less conservative than older drivers (Ryan et al., 1998; Mcgwin and Brown, 1999).

The reports of involvement in accidents in the 12 months preceding the study (7.2%) were slightly lower than the reports in a study with truck drivers of a Brazilian transport company (10.9%) (Ulhoa et al., 2010). This frequency was also lower compared to the reports in studies with drivers in general or with other professional categories of drivers (Silva et al., 2012; Adejugbagbe et al., 2015). However, only 2.6% of truck drivers in the United States reported involvement in accidents in the year 2010, which was lower than the value found in the present investigation. The frequency of near-miss accidents observed here (38.5%) was similar to the frequency observed in truck drivers in Portugal (42.5%) (Catarino et al., 2013) and higher than the frequency found for truck drivers in the United States (24.0%) (Chen et al., 2015). The distinct contexts and study populations may possibly explain these differences. Furthermore, the study by Chen et al. (2015) in the United States employed a seven-day recall period for near-miss accidents.

Some methodological aspects of the present investigation should be highlighted. Sample selection was accomplished through convenience sampling, which limited the external validity of this study. It is also possible that accidents or near-miss accidents were underreported (particularly the less serious ones) due to difficulty in remembering the events. The present study did not include information about the condition of the roads and vehicles at the time of the accident or the culpability of the reported accidents or near-miss accidents. Moreover, it is expected that the prevalence of accidents in studies with primary data is underestimated due to the healthy worker effect (Kenny et al., 2008; Shah, 2009). However, some caution was taken to ensure the methodological quality of the present study: implementation of a pilot study; training of interviewers; review of the collection instruments; and double entry of data. Furthermore, the profile of the investigated drivers resembled the profiles of other studies that investigated this type of worker (Perez-Chada et al., 2005; Souza et al., 2005b; Braeckman et al., 2011; Marqueze et al., 2013; Takitane et al., 2013; Yonamine et al., 2013). Thus, the obtained results should be appreciated and analyzed by traffic authorities, representatives of drivers associations

or unions and employers to implement measures aimed at improving the working conditions and training of these professionals.

In conclusion, the relationship between longer professional experience and a decrease in reporting accidents and near-miss accidents was evident, regardless of age, substance use and professional characteristics. Thus, appropriate adaptations of the current legislation with the inclusion of theoretical training and appropriate practicing hours compatible with the complexity of truck driving (in particular the articulated types) is important. More specifically, some strategies could be suggested to overcome the possible higher risk of accident involvement for truck drivers with limited driving experience, such as increasing in the amount of supervised practical training and the adoption of more stringent practical tests for obtaining truck drivers licenses. A requirement of obtaining a truck driver's license that should also be considered is the increased experience driving a truck, preferably with a licensed driver who has a large amount of experience in driving such vehicles.

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