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Aberrant Driving Behaviours and Risk Factors Among Heavy Truck Drivers in Benghazi, Libya: A Cross-Sectional Analysis

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ABSTRACT

Heavy truck drivers constitute a high-risk occupational group for road traffic accidents, yet limited research has examined the behavioural and psychosocial factors contributing to crash involvement in conflict-affected settings. This cross-sectional study investigated aberrant driving behaviours, work-related factors, and demographic correlates among 100 heavy truck drivers in Benghazi, Libya. Data were collected using the Driver behaviour Questionnaire (DBQ) framework. Results revealed that aggressive violations (Mean = 2.10) were the most prevalent aberrant behaviour category, followed by lapses (2.03), errors (1.96), and ordinary violations (1.59). The highest-rated individual behaviours were expressing anger toward other drivers (mean = 3.83), failure to notice pedestrians or emerging vehicles (Mean = 3.72), and using the horn or chasing to express displeasure (Mean = 3.51). Significant risk factors included extended daily driving hours (22% driving 11–15 hours daily), insufficient sleep (16% sleeping ≤6 hours), and operation of aging vehicles (20% driving trucks aged 33–48 years). Drivers with longer licensing duration (>10 years) demonstrated similar aberrant behaviour patterns to less experienced drivers, suggesting that experience alone does not ensure safe driving practices. Truck age and driver age emerged as the main predictors of aberrant driving behaviours. These findings highlight the urgent need for targeted interventions addressing anger management, hazard perception training, fatigue countermeasures, and enforcement of work-hour regulations. The study contributes to the limited literature on road safety in post-conflict settings and provides an evidence base for developing culturally appropriate driver safety programs in Libya and similar contexts.

سلوكيات القيادة المنحرفة وعوامل الخطربين سائقي الشاحنات الثقيلة في بنغازي، ليبيا: دراسة مقطعية

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الملخص

يشكل سائقو الشاحنات الثقيلة فئة مهنية عالية الخطورة فيما يتعلق بحوادث المرور، ومع ذلك، لا تزال الأبحاث التي تتناول العوامل السلوكية والنفسية والاجتماعية التي تسهم في وقوع الحوادث في المناطق المتأثرة بالنزاعات محدودة. استقصت هذه الدراسة المقطعية سلوكيات القيادة المنحرفة، والعوامل المتعلقة بالعمل، والخصائص الديموغرافية المرتبطة بها لدى 100 سائق شاحنة ثقيلة في بنغازي، ليبيا. جمعت البيانات باستخدام .استبيان سلوك السائق. أظهرت النتائج أن المخالفات العدوانية (المتوسط = 2.10) كانت أكثر فئات السلوك المنحرف شيوعًا، تلها الهفوات (2.03)، والأخطاء (1.96)، والمخالفات العادية (1.59). كانت السلوكيات الفردية الأكثر شيوعًا هي التعبير عن الغضب تجاه السائقين الآخرين (المتوسط = 3.83)، وعدم الانتباه للمشاة أو المركبات القادمة (المتوسط = 3.72)، واستخدام البوق أو المطاردة للتعبير عن الاستياء (المتوسط = 3.51). وشملت عوامل الخطر الرئيسية ساعات القيادة اليومية الطويلة (22% يقودون من 11 إلى 15 ساعة يوميًا)، وعدم

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كفاية النوم (16% ينامون 6 ساعات أو أقل)، وقيادة مركبات قديمة (20% يقودون شاحنات يتراوح عمرها بين 33 و48 عامًا). وأظهر السائقون الحاصلون على رخص قيادة لفترة أطول (أكثر من 10 سنوات) أنماط سلوكية منحرفة مماثلة للسائقين الأقل خبرة، مما يشير إلى أن الخبرة وحدها لا تضمن ممارسات قيادة آمنة. وبرز عمر الشاحنة وعمر السائق كأهم العوامل المنبئة بسلوكيات القيادة المنحرفة. وتؤكد هذه النتائج على الحاجة المُلحة لتدخلات مُوجهة تُعنى بإدارة الغضب، والتدريب على إدراك المخاطر، وتدابير مكافحة الإرهاق، وإنفاذ لوائح ساعات العمل. تساهم هذه الدراسة في الأدبيات المحدودة حول السلامة على الطرق في بيئات ما بعد النزاع، وتوفر قاعدة أدلة لتطوير برامج سلامة السائقين المناسبة ثقافياً في ليبيا وسياقات مماثلة.

1. Introduction

Road traffic accidents represent a global public health crisis, with heavy vehicles disproportionately contributing to severe injuries and fatalities. The World Health Organization estimates that 1.19 million people die annually from road traffic crashes, with more than 90% of these deaths occurring in low- and middle-income countries [1]. In Libya, Road safety remains a major problem and represent the second highest cause of death due to road traffic accidents [2]. The majority of these deaths occur among young people [3]. Libya ranks among the nations with the highest per capita road traffic fatality rates globally, with approximately 26 deaths per 100,000 populations [4].

Truck drivers play a crucial role in the global freight and logistics sector; however, the demanding nature of freight transport—characterized by long working hours, tight schedules, economic pressures, and challenging road conditions—increases their risk of involvement in road traffic crashes. A heavy vehicle composition of 30% is associated with a 5% increase in crash risk, which may negatively influence overall traffic safety [5]. Previous studies have confirmed that major truck crashes found that driver behaviour - related factors were responsible for 58.5% of crashes, followed by factors related to other vehicles at 24.5%, while mechanical failures and adverse weather conditions combined accounted for no more than 10% of crashes [6].

The Driver Behaviour Questionnaire (DBQ), originally developed by the Manchester Driver Behaviour Research Group, is the most widely recognized instrument for measuring self-reported aberrant driving behaviours and their relationship to crash involvement [7]. It has established that aberrant driving behaviours—including aggressive violations, ordinary violations, errors, and lapses—are significant predictors of accident involvement However, it is also used to classify professional truck driver behaviours to predict crash involvement [8]. While the core factor structure remains relatively stable across cultures, global literature demonstrates that the instrument must be adapted to account for the unique vehicle dynamics and occupational pressures of the trucking industry.

Early research focused on New Zealand truck drivers conducted by [9], which utilized a 28-item Driver behaviour Questionnaire to investigate aberrant driving behaviours among the drivers. The results indicated that, after controlling for age of drivers and annual mileage, only the violations factor was a significant predictor of actual crash involvement, with the odds of being involved in a crash increasing by a factor of 1.50 for each unit increase in the violation score.

Another study by [10] utilized a Persian-translated DBQ and self-evaluation scales to assess the association between aberrant behaviours and road accidents among 300 truck drivers in Yazd, Iran. The results revealed that misjudging the speed of oncoming vehicles and deliberately disregarding speed limits at night were the most frequent behaviours, and drivers influenced by emotional or mental states reported higher rates of violations and slips.

A study on identifying risk factors among truck drivers in Egypt was carried out by [11]. a 47-question DBQ tailored to local habits was used to identify factors contributing to accident risks among the truck drivers. According to the research the driver fatigue (specifically driving more than 15 total hours or 8 continuous hours), drug use during long journeys, and driver obesity were the most significant predictors of truck accidents.

In Study [12] the Manchester Driver Behaviour Questionnaire (MDBQ) was conducted based evaluation of 250 Iranian drivers carrying hazardous materials at an international border. The results revealed that drivers carrying inflammable liquids committed significantly more lapses than those carrying gases, and that young drivers under 40 years of age reported the highest rates of aggressive violations and errors.

Effort was attempted by [13] to applied artificial neural network (ANN) models to predict the frequency of aberrant driving behaviours based on the Big Five personality traits of truck drivers in Taiwan. Results identified that the proposed models achieved high stable predictive performance, revealing that traits such as neuroticism were positively associated with risky behaviours, while high levels of conscientiousness served as a primary protective factor against speeding and hard deceleration.

In Study [14], authors developed a specialized 20-item DBQ and a 6-item Positive Driver Behaviour Questionnaire (PDBQ) to analyze the behaviours of heavy semi-trailer truck drivers in China. Their findings indicated that negligence/lapses and driving time were the variables most strongly related to traffic accidents, where a one-unit increase in the negligence factor increased accident probability by 2.293 time.

In Study [15] the authors used binary logit techniques and machine learning algorithms to investigate the contributory factors influencing speeding behaviour among 756 long-haul truck drivers in India. Their results revealed that the Random Forest (RF) model outperformed other techniques with 80% accuracy, identifying pressured delivery of goods, inadequate sleep duration, and newer truck age as the topmost critical factors driving speeding intentions.

A study on truck driver behaviour in Bihar, India, was conducted by [16]. The researchers employed the (DBQ) to investigate the relationship between driving behavior and demographic characteristics. The findings revealed that violations, errors, and positive driving behaviours were significant predictors of crash involvement, emphasizing the importance of behavioural assessment, targeted driver training, and enforcement strategies for improving truck safety.

In conclusion, the reviewed studies consistently emphasize that truck driver behaviour is a critical determinant of crash occurrence, with violations, errors, fatigue, speeding, and driver-related characteristics emerging as the most influential risk factors. The findings also highlight the effectiveness of the Driver Behaviour Questionnaire (DBQ) in identifying unsafe driving patterns across different countries. These findings underscore the importance of integrating behavioural assessment, driver training, and data-driven safety strategies to reduce truck-related crashes.

Benghazi, Libya's second-largest city, has experienced substantial urbanization, motorization, and post-conflict reconstruction activity. These developments have been accompanied by escalating traffic congestion and road accidents, with heavy trucks emerging as a particularly concerning contributor to crash-related fatalities and injuries. The city's strategic role as a commercial hub—hosting Libya's second-largest port—ensures high volumes of freight transport, yet the road infrastructure, traffic management systems, and driver training programs have not kept pace with this growth.

Although the Driver Behaviour Questionnaire (DBQ) has been extensively applied to investigate aberrant driving behaviours among professional truck drivers in many countries, significant knowledge gaps remain in the Libyan context. Existing Libyan road safety research has primarily focused on crash statistics, injury severity, and accident reporting systems, no previous study has applied or validated the aberrant driving behaviours among heavy truck drivers in Libya.

Given Libya's unique post-conflict transport environment, aging truck fleet, weak enforcement of traffic regulations, and demanding freight operations, findings from other countries cannot be directly generalized. Therefore, this study addresses these important gaps by providing the first comprehensive assessment of aberrant driving behaviours and their associated risk factors among heavy truck drivers in Benghazi, thereby generating evidence to support context-specific road safety interventions and policy development.

The specific objectives of this study were to: (1) characterize the demographic and occupational profile of heavy truck drivers in Benghazi, (2) assess the prevalence of aberrant driving behaviours across four categories (ordinary violations, aggressive violations, errors, and lapses), (3) identify work-related and vehicle-related risk factors associated with unsafe driving practices, and (4) examine the relationship between driver characteristics and aberrant behaviour patterns.

2. Materials and Methods

This cross-sectional study was conducted in Benghazi Municipality, Libya, between February and May 2024. The study area encompasses the city proper and its surrounding suburbs, extending from Sidi Khalifa in the east to Al-Maqrun in the west, and from Binina in the south to the Mediterranean coastline in the north.

The study population comprised heavy truck drivers operating within Benghazi, encompassing both independent owner-operators and drivers employed by various freight transport companies. Using a purposive sampling strategy, a total of 120 drivers from these enterprises were initially approached, of which 100 successfully completed the questionnaire (n=100), yielding a strong response rate of 83.3%.

In Libya, Trucks are classified as vehicles intended for transporting goods, supplies, and animals, while the applicable regulations specify permissible gross weights according to axle configuration. however, heavy vehicles are specified as having maximum gross vehicle weights of more than 16 tons for two- or more-axle trucks. Accordingly, the study population was operationally defined as drivers operating goods-transport trucks within these regulated heavy-truck configurations, rather than drivers of light- or medium-duty vehicles.

To assess the adequacy of the sample size, a priori power analysis was conducted using G*Power software, version 3.1.9.7 for the multiple linear regression models. The recommended settings of for G*power are 0.05 of significance level, the effect size of 0.15 (small effect), and the minimum power level is 0.80 [17,18]. Thus, for number of predictors 9, the minimum sample size of the study should be of 77 truck drivers. A total sample size of 100 is enough to invite the truck drivers to fill DBQ questionnaire. Although a larger sample would increase statistical precision, this sample size was considered adequate for the exploratory cross-sectional nature of the study. This approach was necessitated by the absence of a comprehensive registry of all heavy truck drivers in the city.

Inclusion criteria were: (1) currently employed as a heavy truck driver, (2) operating within Benghazi city limits or its immediate surroundings, and (3) willingness to provide informed consent. No exclusion criteria were applied regarding age, experience, or vehicle type.

The Manchester Driver Behaviour Questionnaire (MDBQ) was adopted comprising four sections:

Section 1: Demographic and Personal Information. This section collected data on age, educational level, marital status, licensing status and duration, and years of driving experience.

Section 2: Vehicle and Load Characteristics. Items addressed vehicle type, vehicle age, type of cargo typically transported, and typical load weight.

Section 3: Driving Habits and Practices. This section examined daily driving hours, weekly driving days, preferred route types (urban, inter-city, cross-border), sleep duration, and accident history.

Section 4: Aberrant Driving behaviours. A 26-item scale adapted from established Driver Behaviour Questionnaire frameworks assessed four categories of aberrant behaviours: ordinary violations (5 items), aggressive violations (5 items), lapses (8 items), and errors (8 items). Responses were recorded on a 6-point Likert scale: 0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4= Usually, 5 = Always.

The questionnaire was administered through face-to-face interviews conducted by trained research assistants, with each interview lasting approximately 20–25 minutes.

The coefficients of Cronbach's alpha for the questionnaire items were relatively low, being 0.62 for the ordinary violations, 0.66 for the aggressive violations, 0.63 for the lapses and 0. 67for errors. Although the Cronbach's alpha values (0.62–0.67) appear low, they are entirely consistent with the reliability levels generally found in previous DBQ studies [9],[16],[19], which have reported similar or lower scores (e.g., 0.62 for lapses and 0.57 for aggressive violations). Furthermore, removing items from the DBQ scales does not improve internal consistency. Consequently, these values are considered marginally acceptable in this context, and the findings should be interpreted as "exploratory," providing preliminary insights into behavioral dimensions rather than definitive predictors.

Data was entered and analyzed into SPSS version 26. Descriptive statistics-including frequencies, percentages, means, and standard deviations-were computed for all variables. Mean scores were calculated for each behaviour category and for individual items to identify the most prevalent behaviours.

To investigate the correlation between demographic and occupational characteristics with DBQ items, Pearson correlation was used between variables. Multiple linear regression model was used to identify the relation between the demographic/driving characteristics and the aberrant driving behaviours. The distribution of predictors was normal. The significant level of all statistical analyses was considered at a p-value of less than 0.05.

Ethical approval was obtained from the relevant institutional review board. All participants provided written informed consent prior to participation, and confidentiality of responses was assured. Participation was voluntary, and no incentives were offered.

3. Results

3.1 Demographic and Occupational Characteristics

The sample (n = 100) comprised predominantly male drivers (100%), reflecting the gender composition of the heavy truck driving profession in Libya.

The largest age group was 36–45 years (32%), followed by 18–25 years (23%), 46–55 years (20%), 26–35 years (10%), and 55+ years (15%).

The majority had below-secondary education (48%), with 35% having completed secondary education or equivalent, 17% holding university degrees.

Married drivers constituted 69% of the sample, while 31% were unmarried. About 54% had held their license for more than 10 years, 27% for 6–10 years, 14% for 1–5 years, and 5% reported driving without a valid license.

50% reported covering more than 100 km daily, 29% covered 60–90 km, and 21% covered less than 60 km.

3.2 Vehicle Characteristics

Vehicle Type: IVECO trucks dominated the sample (66%), followed by DAF (13%), FIAT (12%), and other brands (9%).

The distribution was: 1–16 years (38%), 17–32 years (37%), 33–48 years (20%), and 49+ years (5%).

Cargo Type: General cargo was most common (60%), followed by cement (17%), fuel (8%), bulk grain (5%), and other cargo (10%). About 50% carried 21–40 tons, 41% carried 1–20 tons, and 9% carried more than 40 tons.

3.3 Driving Habits and Work Patterns

39% had been driving trucks for less than 10 years, 30% for 11–20 years, 22% for 21–30 years, and 9% for more than 30 years.

69% drove 6–10 hours daily, 22% drove 11–15 hours, and 9% drove less than 6 hours.

Weekly Driving Days: 28% drove 6 days per week, 23% drove 7 days, 17% drove 4 days, and the remainder drove fewer days.

43% preferred inter-city routes, 36% preferred urban routes, 16% preferred regional routes, and 5% preferred cross-border routes.

42% reported sleeping 8 hours daily, 20% slept 7 hours, 16% slept 6 hours, and 22% slept more than 8 hours or had irregular patterns.

3.4 Accident History

asking drivers to report the number of traffic accidents they had been involved in during the previous three years. There are 72% of surveyed drivers reported no prior accident involvement (before 3 years. Among those with accident history (28%), the distribution was: 6% had been involved in one accident, 7% in two accidents, and 15% in three or more. Documented causes included inattention, excessive

speeding, tire blowouts, and reckless driving.

3.5 Aberrant Driving behaviours

Table 1 presents the mean scores and standard deviations for the four categories of aberrant driving behaviours. Aggressive violations recorded the highest mean score (M = 2.10, SD = 0.73), followed by lapses (M = 2.03, SD = 0.59), errors (M = 1.96, SD = 0.61), and ordinary violations (M = 1.59, SD = 0.59). Overall, aggressive violations emerged as the most frequently reported driving behaviour among the participants, whereas ordinary violations exhibited the lowest mean score**.**

Table1: Mean scores and standard deviations for the four behaviour category

behaviour Category	Mean	Standard Deviation	Rank
Aggressive Violations	2.10	0.73	1
Lapses	2.03	0.59	2
Errors	1.96	0.61	3
Ordinary Violations	1.59	0.59	4

Table 2 presents the mean scores for the highest-rated aberrant driving behaviour items. The highest mean score was recorded for the aggressive violation item, "You get angry at a certain type of driver and express your anger in any possible way" (M = 3.83, SD = 1.38), followed by the error item, "You did not notice a person wanting to cross the road at a pedestrian crossing or someone emerging from behind a parked vehicle" (M = 3.72, SD = 1.34). Another aggressive violation related to expressing anger toward other drivers ranked third (M = 3.51, SD = 1.36). The remaining two highest-scoring items belonged to the lapses category, involving unintended route deviation (M = 3.37, SD = 1.04) and failure to notice an object while reversing (M = 3.31, SD = 1.26). Overall, the highest-ranked behaviours were predominantly associated with aggressive violations, followed by errors and lapses.

Table 2: The highest-rated individual aberrant behaviour items

Item	Category	Mean	SD
You get angry at a certain type of driver and express your anger in any possible way	Aggressive Violations	3.83	1.38
You did not notice a person wanting to cross the road at a pedestrian crossing or someone emerging from behind a parked vehicle	Errors	3.72	1.34
You show your anger at another driver's behaviour and use the horn or chase them to express your displeasure	Aggressive Violations	3.51	1.36
You were going to a certain destination but suddenly remembered and found yourself at another destination	Lapses	3.37	1.04
You hit a solid object that you had not previously seen or noticed when reversing	Lapses	3.31	1.26

Table 3 presents the Pearson correlation coefficients between driver characteristics and the four categories of aberrant driving behaviour s. Significant negative correlations were observed between age, driving experience, and truck age with aggressive violations, errors, and ordinary violations. Truck age also showed a weak negative correlation with lapses ($p<0.05$). Among the operational characteristics, average daily mileage and driving time per day were negatively correlated with errors, whereas sleep time per day exhibited a significant negative correlation with errors ($r = -0.264$, $p < 0.01$). No significant correlations were found for weekly working hours, typical truck load, or crash involvement during the previous three years.

Table 3. Pearson correlations between Driver Characteristics and behaviour category

	Aggressive Violations	Lapses	Errors	Ordinary Violations
Age	-0.311**	-0.077	-0.275**	-0.457**
Average kilometer mileage	-0.151	-0.110	-0.305**	-0.169
Driving age/experience	-0.339**	-0.121	-0.318**	-0.388**
Truck Age	-0.319**	-0.245*	-0.434**	-0.217*
typical load of a truck	0.077	-0.063	-0.039	0.035
Driving time per day	-0.098	-0.056	-0.230*	-0.092
working per week	-0.039	0.066	0.126	-0.072
Sleep time per day	-0.131	-0.081	-0.264**	-0.179
Crashes in three years	0.174	0.118	-0.025	0.107

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4 presents the standardized regression coefficients (β) for the predictors of the four categories of aberrant driving behaviours. Truck age was the only variable significantly associated with aggressive violations ($\beta = -0.290$, $p < 0.05$), lapses ($\beta = -0.280$, $p < 0.05$), and errors ($\beta = -0.319$, $p < 0.05$). In contrast, ordinary violations were significantly predicted only by driver age ($\beta = -0.425$, $p < 0.05$). No significant associations were observed for average daily mileage, driving experience, truck load, driving time, weekly working days, sleep duration, or crash involvement. The regression models explained between 9.4% and 24.7% of the variance in the four behavioural categories ($R^2 = 0.094–0.247$).

Table 4. Standardized Coefficients (β) of Multiple regression results with behaviour category

	Aggressive Violations	Lapses	Errors	Ordinary Violations
Age	-0.193	0.029	-0.125	-0.425*
Average kilometre mileage	0.101	-0.051	-0.016	-0.051
Driving age/experience	-0.039	-0.090	-0.143	-0.018
Truck Age	-0.290*	-0.280*	-0.319*	-0.114
typical load of a truck	0.075	-0.070	0.001	0.065
Driving time per day	0.006	0.064	-0.044	0.010
working per week	-0.074	-0.005	0.052	-0.102
Sleep time per day	-0.045	-0.027	0.059	0.040
Crashes in three years	0.155	0.171	-0.002	0.077
R^2	0.212	0.094	0.247	0.240
R^2 adjusted	0.133	0.003	0.172	0.164

* P<0.05

To further assess the adequacy of the final sample, a post-hoc power analysis was conducted using G*Power software for the multiple linear regression models. The analysis was based on the observed R^2 values, a significance level of 0.05, a total sample size of 100 participants, and nine predictors. The corresponding statistical power was 0.958, 0.536, 0.986, and 0.982 for aggressive violations, lapses, errors, and ordinary violations, respectively. Thus, the observed models showed adequate power for three outcomes, whereas the lapses model had comparatively limited statistical power and should therefore be interpreted cautiously.

4. Discussion

4.1 Prevalence of Aberrant Behaviours

The finding that aggressive violations were the most prevalent category of aberrant behaviour among Benghazi truck drivers is consistent with research from other contexts where heavy vehicle drivers report elevated levels of frustration and anger toward other road users [9-11]. The high mean scores for expressing anger and using the horn to express displeasure suggest that emotional regulation is a significant challenge for this population. However, the relatively high prevalence of aggressive violations observed in the present study may also reflect the unique characteristics of the Libyan transport environment, including weak traffic law enforcement, post-conflict road conditions, traffic congestion, and limited driver monitoring systems. These conditions may increase drivers' frustration and reduce compliance with traffic regulations, thereby encouraging aggressive responses during daily freight operations.

The prominence of aggressive violations over other behaviour categories is particularly concerning given the potential consequences. Aggressive driving-including tailgating, unsafe lane changes, and speed competition-has been consistently associated with increased

crash risk in heavy vehicle operations. The physical characteristics of trucks-their mass, dimensions, and stopping distances-mean that aggressive manoeuvres carry disproportionate risk compared to similar behaviours in passenger vehicles.

The second most frequently reported behaviour—failing to notice pedestrians or vehicles emerging from behind parked vehicles—is consistent with previous studies focusing the visibility limitations and cognitive demands associated with heavy vehicle operation [20]. In Libyan roads, where inadequate parking control, roadside encroachments, poor pedestrian facilities, and limited traffic management increase the likelihood of unexpected pedestrian movements and visual obstructions. These conditions differ from those in many developed countries, where road infrastructure and traffic control systems are generally better designed to reduce conflicts between heavy vehicles and vulnerable road users. This finding underscores the importance of:

1. Enhanced mirror systems and blind spot detection technologies
2. Driver training focused on hazard perception and systematic scanning
3. Infrastructure improvements including dedicated truck routes and separated pedestrian facilities.

The two highest-ranked lapse behaviours were unintentionally arriving at a different destination than originally intended and colliding with an unseen object while reversing. These findings are consistent with previous research indicating that lapses are strongly associated with fatigue, prolonged driving duration, and increased mental workload among professional drivers [21]. These findings suggest that cognitive lapses associated with reduced attention, temporary memory failure, and diminished situational awareness are relatively common among heavy truck drivers in Benghazi. This is caused by long working hours, insufficient rest, irregular work schedules, and occupational stress, which substantially impair drivers' cognitive performance.

4.2 Factors Associated with Aberrant Driving Behaviours

The negative associations of age, driving experience and sleep duration with aberrant driving behaviours agree with previous studies showing that experienced drivers exhibit safer driving practices [22] [23]. Truck age and driver age emerged as the main predictors of aberrant driving behaviours, emphasizing the influence of Libya's aging vehicle fleet and driver characteristics. These findings emphasize the need for fleet modernization, regular vehicle inspections, and targeted safety training to improve heavy truck safety.

4.3 Work-Related Fatigue as a Contributing Factor

The finding that 22% of drivers reported driving 11–15 hours daily, combined with 16% sleeping only 6 hours or less, suggests that fatigue is a significant concern. Research from multiple countries has established that fatigue contributes to more than 30% of truck accidents [21]. Extended working hours impair cognitive function, reaction time, and decision-making capacity—all critical for safe heavy vehicle operation

The discrepancy between reported sleep duration and fatigue risk is notable. While 42% reported sleeping 8 hours, the quality and timing of sleep—particularly for drivers with irregular schedules or night work—may be insufficient to ensure alertness during driving hours. Additionally, the economic pressures of the freight industry may incentivize drivers to underreport fatigue or continue working despite feeling tired.

4.4 Vehicle Age and Mechanical Reliability

The 20% of surveyed drivers operating heavy trucks aged 33–48 years represents a significant safety concern. Aging vehicles lack modern safety features—including anti-lock braking systems, electronic stability control, and advanced driver assistance systems—that have been demonstrated to reduce crash risk. Moreover, mechanical failures become more probable with age, with tire blowouts, brake failures, and steering malfunctions identified as contributing factors in reported accidents. This finding aligns with [24] observations that Libya's vehicle fleet includes many aging, imported vehicles. The economic constraints that limit access to newer vehicles, combined with inadequate vehicle inspection and maintenance systems, perpetuate this safety risk.

4.5 Licensing and Experience

The finding that 54% of drivers had held licenses for more than 10 years, yet demonstrated similar aberrant behaviour patterns to less experienced drivers, challenges assumptions that experience alone ensures safe driving [25]. This suggests that:

1. Initial training may be inadequate in addressing behavioural risk factors.
2. Continuing education and refresher training are needed to reinforce safe practices
3. Licensing renewal processes may not effectively screen for behavioural competencies
4. The 5% of drivers reporting no valid license represents a serious enforcement gap that requires immediate attention.

4.6 Cultural and Contextual Factors

The Libyan context—characterized by post-conflict instability, economic pressures, and limited institutional capacity—presents unique challenges for road safety. The absence of effective traffic enforcement, inadequate road infrastructure, and limited public awareness campaigns create an environment where dangerous driving behaviours are normalized. The finding that driver's express frustration with "reckless" other drivers suggests a perception of shared responsibility, yet also indicates that aggressive responses to perceived provocations are common.

4.7 Limitations

Several limitations should be acknowledged. First, the relatively small sample size and the purposive sampling strategy may limit generalizability to the broader population of truck drivers in Benghazi. Second, self-reported behaviours are subject to social desirability bias, with drivers potentially underreporting dangerous behaviours. Third, the cross-sectional design precludes causal inferences regarding the relationship between behaviours and accident involvement. Finally, the study focused on individual driver, vehicle, and work-related characteristics, while other potentially important factors, such as organizational safety practices, road infrastructure, and traffic enforcement, were not examined.

5. Conclusions & Recommendations

This study provides the first systematic examination of aberrant driving behaviours among heavy truck drivers in Benghazi, Libya. The findings reveal that aggressive violations are the most prevalent category of unsafe driving behaviours followed by driving errors and lapses, with expressing anger toward other drivers and failure to notice pedestrians or emerging vehicles being particularly common. The findings also suggest that driver age, experience, fatigue, and the aging truck fleet contribute to unsafe driving behaviours within the Libyan transport environment.

The implications for policy and practice are substantial. First, driver training programs must address not only technical skills but also behavioural competencies—including anger management, emotional regulation, and hazard perception. Second, work-hour regulations must be enforced to prevent fatigue-related impairment, with mechanisms for monitoring and accountability. Third, vehicle age limits and mandatory periodic inspections should be implemented to remove unsafe vehicles from the road. Fourth, traffic enforcement must be strengthened to deter dangerous behaviours, with particular attention to speeding, aggressive driving, and unlicensed operation.

Future research should employ longitudinal designs to examine the causal relationship between aberrant behaviours and accident involvement, incorporate objective measures of driving behaviour (e.g., telematics, dashcam footage), and evaluate the effectiveness of specific interventions in the Libyan context. Organizational factors—including company safety culture, economic pressures, and management practices-merit investigation to identify systemic contributors to driver behaviour.

The road safety crisis in Benghazi demands urgent and sustained action. The human and economic costs of heavy truck accidents are too substantial to ignore, and the evidence from this study provides a foundation for developing targeted, evidence-based interventions to improve safety for truck drivers and all road users.

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