

## Driving Behavior in Jordan: The Role of Age and Gender

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### ABSTRACT

Recently, aggressive driving has become a topic of great concern among transportation officials and researchers. Aggressive driving can be defined as any behavior which will offend other drivers or as any unsafe driving behavior. This behavior may lead to a physical or psychological harm to the driver him/herself or other road users. Aggressive driving behaviors include honking, tailgating, speeding, running red light, flashing high beams and rude gesturing. This paper presents the results of a study conducted to develop a clear understanding of the current driving behavior in Jordan based on the socio-characteristics of drivers. The data needed for this study was obtained from a survey questionnaire. The results were analyzed in two levels. In the first level of analysis, all results were categorized based on gender. In the second level of analysis, all the results were categorized based on two age groups (young drivers of age 18-29 and adult drivers of age  $\geq 30$  years). It was found that: 1) Jordanians adopted some of the worst driving habits, 2) there were significant differences between male and female drivers in the following driving behaviors: male drivers have a higher tendency to drive with higher speeds than female drivers, which led to a higher tendency to drive at the middle of two lanes neglecting lane making, flashing high beams at other drivers and tailgating so they can overtake any vehicle that is driving slower than them, 3) there were statistically significant differences between male and female drivers in the gap acceptance and location at which drivers stop to make any turn, 4) male drivers have a higher tendency to smoke while driving than female drivers; however, female drivers have a higher tendency to drink and/or eat, get busy with radio and use phone while driving than male drivers, 5) females have a higher tendency to use the horn while driving than males, finally 6) it was found that Jordanians have acceptance to some unfamiliar driving habits, such as: using hand as a tool for changing lanes as they describe it as a mandatory and easy tool for changing lanes, allowing kids to dangle themselves outside the vehicle's window to have some fun and closing roads for special occasions, such as wedding and graduation.

**KEYWORDS:** Aggressive driving, Driving behavior, Traffic safety, Young drivers, Adult drivers.

### INTRODUCTION

Roadways, vehicles and road users are the basic elements of a traffic stream. In reviewing the literature, for the last three decades, particular attention has been

given to improving safety characteristics of both vehicles and roadway environment while less attention has been given to road users, including drivers, pedestrians and riders who are essential components of the traffic stream. Driver's aggressive behavior is considered a major danger to the safety of all road users. A recent study conducted by the American Automobile Association (2009) reported that 56% of the fatal

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crashes that occurred between 2003 and 2009 involved potential aggressive driving behavior. No single definition of aggressive driving has been adopted in the traffic safety literature. In a number of studies, aggressive driving is defined as any unsafe, pushy and selfish driving behavior to risk someone's and something's safety (AAA, 2009; Neuman et al., 2003; Tasca, 2000). In a report published by the National Highway Traffic Safety Administration, aggressive driving is described as mean driving actions that obviously exceed the norms of safe driving behavior and directly affect other road users by placing them in unnecessary threat (NHTSA, 2009). In another online report published by NHTSA for low enforcement community, aggressive driving was defined as "*when individuals commit a combination of moving traffic offenses so as to endanger other persons or property*". Offenses are considered as an aggressive driving indicator in this definition.

The Association for the Advancement of Medical Instrumentation reported that aggressive driving phenomenon is increasing in highly motorized countries, such as the USA, Canada and the UK (AAMI, 2002). Some researchers believe that the increased number of vehicles competing for limited road infrastructure may cause an increase in aggressive driving. Increase in vehicles and traffic congestion lead to an increase in frustration and stress levels of drivers (Shinar, 1998; Bener et al., 2006). Jordan, one of the developing countries, also suffers from this problem. Jordan has a decent position among the neighboring countries due to its secure political situation, geographic location and moderate climate. The number of refugees, foreign visitors and vehicles that entered the country has increased in the last five years. Statistics of Borders and Residence Department (BRD) indicated that during the year 2013, the number of people who entered the Jordan borders was 2,322,489 people of non-Jordanian nationalities. A study conducted by the Traffic Department/ Public Security Directorate (Traffic Department, 2013) reported that more than 1,060,706 additional vehicles entered the country in 2013. In

another study conducted by Traffic Department/ Public Security Directorate (TD, 2014), it was found that human factors were the main cause for accidents with the highest percentage of 94.96 percent. This finding is consistent with previous studies (Rumar, 1985). Furthermore, traffic congestion is becoming a way of life in Jordan and accident rate has increased with an annual growth rate of 3.2% for the past ten years (Traffic Department, 2014).

The main objective of this study was to develop a clear understanding of the current driving behavior in Jordan based on the socio-characteristics of drivers. The data needed was obtained from a survey questionnaire. The survey focused more on specific unsafe driving acts rather than on aggressive driving. It contained a total of seventeen questions related to driving behaviors on the road, in-vehicle driver behavior, driver's reactions when facing road problems, driver's opinion about unsafe behaviors, road safety level in Jordan and an open ended question. The results were analyzed in two levels. In the first level of analysis, all the results were categorized based on gender. In the second level of analysis, all the results were categorized based on different age groups. The proportions of each question were found using MS excel sheets and the two-sample t-test was used to find the statistical significance among different gender and age groups.

## METHODOLOGY

The data needed for this study was obtained from a survey questionnaire. A sample size of 384 was calculated using an online calculator assuming a confidence interval of 95% with a marginal error of 5%. A sample size of 550 was used with a response rate of 74%. The survey was conducted between the 15<sup>th</sup> of February and the 30<sup>th</sup> of April 2015. The questionnaire was distributed to different age groups of male and female drivers. The questionnaire was written in Arabic, because it was intended to target all drivers' educational levels. The survey focused more on specific unsafe driving acts rather than on aggressive driving. It

contained a total of seventeen questions; twelve of them were related to drivers obeying traffic regulations, one question was about in-vehicle driver behavior including smoking, drinking and eating, being busy with the radio and talking or texting on the phone, one question was about drivers' opinions about some road issues like facing a situation, one question was about drivers'

opinions about unsafe behaviors, one question was about road safety level in Jordan, in addition to one open ended question in which drivers were asked about their opinions about the reasons for aggressive driving in Jordan. Table 1 shows a list of the unsafe driving acts considered in this study.

**Table 1. List of unsafe driving acts**

	Question	Probable Answer
<b>Obeying Traffic Regulation Questions</b>	1. Do you obey traffic control devices?	Yes/No
	2. Do you obey the speed limit?	
	3. Do you drive on the opposite direction of the road?	
	4. Do you pass on the shoulder of the road?	
	5. Do you change lanes without signaling?	
	6. Do you drive on the middle between two lanes?	
	7. Do you change lane in an inappropriate way (change from the right lane to the left lane without using the middle lane)?	
	8. Do you flash high beams at other drivers?	
	9. Gap acceptance: (Do you wait until the last second to merge with traffic on the highway)?	
	10. Location for stopping to turn: Do you stop in the storage lane or in the middle of the intersection?	
	11. Do you do tailgating?	
	12. Do you follow parking regulations?	
<b>In-Vehicle Behavior</b>	13. Do you do any of the following behaviors while driving? You can choose more than one behavior.	Smoke;
		Drink and/or eat;
		Get busy with radio;
		Use mobile phone while driving.
<b>Driver's Reaction when Facing Road Problems</b>	14. What do you do if you face a problem with other road users? You can choose more than one behavior.	Do nothing;
		Horning;
		Use verbal insults;
		Use physical violence;
<b>Driver's Opinion about Unsafe Behaviors</b>	15. Do you agree with the following behaviors?	Using hand signal for changing lanes;
		Kids dangle themselves outside vehicle windows;
		Road closure in special occasions.
<b>Road Safety Level in Jordan</b>	16. How do you rank road safety in Jordan?	Very good
		Good
		Acceptable
		Unsafe
<b>Open Ended Question</b>	17. From driver's opinion, what are the reasons for aggressive driving behavior in Jordan?	

## RESULTS AND DISCUSSION

The results were analyzed in two levels. In the first level of analysis, all results were categorized based on gender. The proportions of each question were found using MS excel sheets, then the results were exported from the excel sheets to the Statistical Package for Social Sciences, Version 19 (SPSS 19) software. The two sample t-test was used to find the statistical significance between the two gender groups. In the second level of analysis, all the results were categorized based on different age groups. Also, the proportions of each question were found and the two-sample t-test was used to find the statistical significance among different age groups.

### Level One

The first level of analysis focused on the driving behavior differences between male and female drivers.

### Obeying Traffic Regulations

Questions 1 through 12 were analyzed. They were based on obeying traffic regulations. The analysis was carried out for the participants who do not obey traffic regulations, as they reflected the aggressive driving behavior. The proportion of each question was calculated for male and female drivers, separately. Statistical analyses of the data were performed using the two-sample t-test at 95 percent level of confidence to determine whether there are any differences between male and female drivers in obeying traffic regulations. To accomplish this, the following null and alternative hypotheses were used:

$H_0$ : the percentages of male and female drivers who don't obey traffic regulations are equal.

$H_1$ : the percentages of male and female drivers who don't obey traffic regulations are different.

Table 2 summarizes the results of comparing male and female drivers who don't obey traffic regulations including the statistical analysis results shown in the rightmost column of the table.

**Table 2. Male and female drivers not obeying traffic regulations**

Question	Female Proportion	Male Proportion	P- value	Hypothesis Test Result
Don't obey traffic control device	6.7%	7.6%	0.365	Fail to Reject
Don't obey speed limit	22.9%	32.0%	0.022	<i>Reject</i>
Driving in the opposite direction of the road	24.4%	27.9%	0.218	Fail to Reject
Passing on road shoulder	51.1%	42.2%	0.963	Fail to Reject
Changing lanes without signaling	4.5%	8.4%	0.058	Fail to Reject
Driving at the middle between two lanes	15.5%	28.0%	0.001	<i>Reject</i>
Changing lanes in an inappropriate way	27.2%	31.4%	0.060	Fail to Reject
Flashing high beams at other drivers	49.1%	75.1%	0.000	<i>Reject</i>
Gap acceptance	19.2%	27.0%	0.001	<i>Reject</i>
Location for stopping to turn	14.1%	21.7%	0.002	<i>Reject</i>
Tailgating	11.7%	18.5%	0.032	<i>Reject</i>
Not following parking rules	19.1%	18.4%	0.651	Fail to Reject

It can be concluded from Table 2 that gender generally doesn't affect how drivers in Jordan behave on the road network, but there were statistically significant

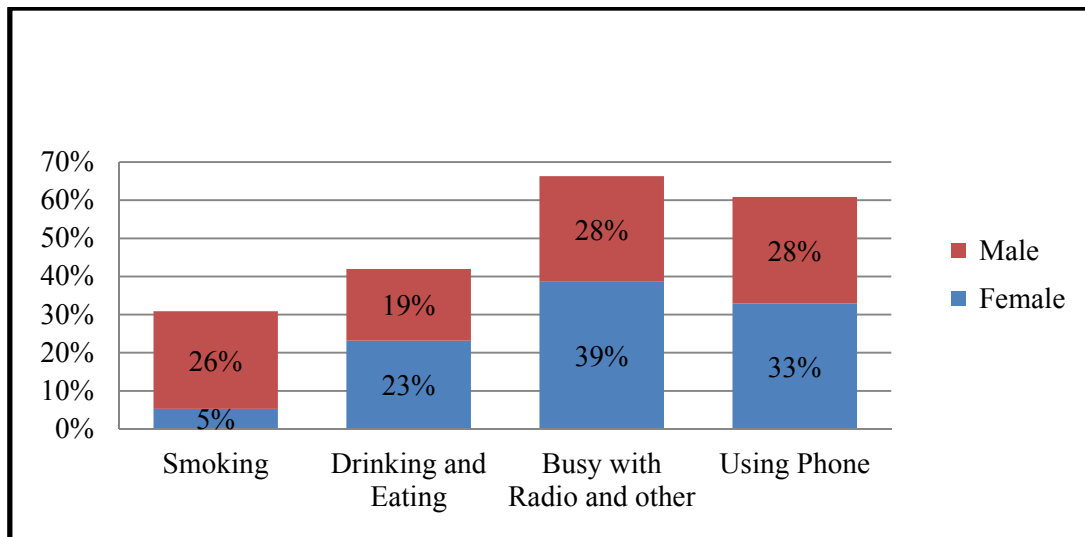
differences between male and female drivers in several driving behaviors. 32% of male drivers exceeded the speed limit compared to 23% of female drivers; so, male

drivers had a higher tendency to drive with higher speeds than female drivers. Logically, this led to driving at the middle of two lanes, neglecting lane marking (28% of male drivers compared to 16% of female drivers). Also, it was observed that 75% of male drivers used high beams to overtake vehicles compared to 49% of female drivers. The proportion of male drivers who tailgate was 19% compared to 12% of female drivers. Finally, there were statistically significant differences between male (27%) and female (19%) drivers in gap acceptance and 22% of male drivers don't stop at the right lane compared to 14% of female drivers.

Generally, analyses of the data reported in this study revealed a significantly higher rate of not obeying traffic regulations among male drivers when compared with female drivers.

***In-Vehicle Behavior***

Question 13 was analyzed. Figure 1 shows the proportions of some habits inside vehicles for both female and male drivers while driving, including smoking, eating and drinking, getting busy with the radio, talking or texting.



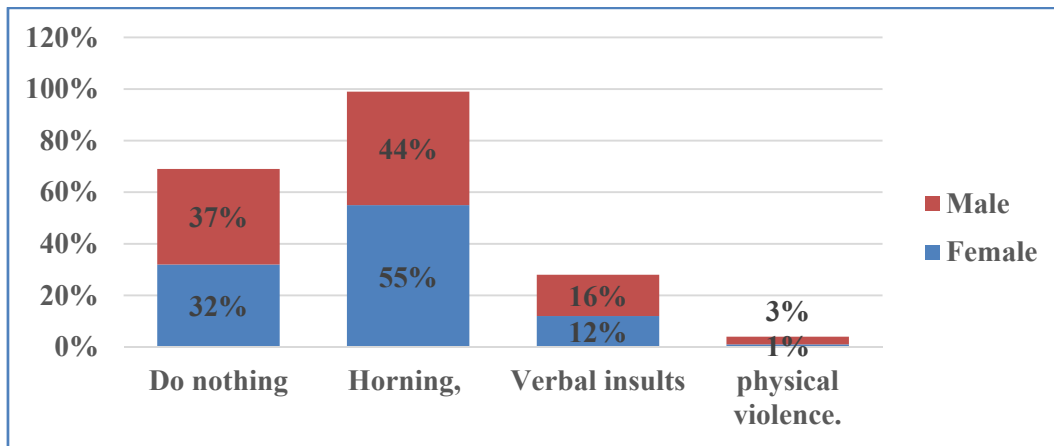
**Figure (1): In-vehicle behavior based on gender**

It was found that male drivers were approximately five times as likely as female drivers to smoke while driving (5% of female drivers compared to 26% of male drivers). Also, it was found that 23% of female drivers compared to 19% of male drivers drank and ate inside the vehicle while driving. Furthermore, Figure 1 shows that 39% of female drivers compared to 28% of male drivers were busy with radio while driving and 33% of

female drivers compared to 28% for male drivers used mobile phone while driving.

***Driver's Reactions When Facing Road Problems***

Question 14 was analyzed. Figure 2 shows the proportions of male and female drivers' reaction to a situation on the road, including doing nothing, honking, using verbal insults and using physical violence.



**Figure (2): Drivers' reactions when facing road problems**

Figure 2 shows that 32% of female drivers compared to 37% of male drivers prefer to keep silent and continue their journey and 55% of female drivers compared to 44% of male drivers use vehicle horn. Moreover, it was found that 12% of female drivers will become angry and use verbal insults compared to 16% of male drivers. Moreover, it was found that 1% of female drivers will use physical violence compared to 3% of male drivers.

***Drivers' Opinions about Some Unsafe Behaviors in Jordan***

Question 15 was about drivers' opinions about several crazy and unsafe driving behaviors in Jordan, including using hand signal to force other drivers to stop or give priority, ignoring kids and allowing them to dangle themselves outside the car window and closing the road for special occasions such as wedding and graduation. Table 3 presents the proportions of female and male drivers who believe that these behaviors would not negatively affect traffic safety.

**Table 3. Drivers' opinions about some unsafe driving behaviors in Jordan**

Is this act dangerous?	Percentage of whom saying yes	
	Females	Males
Using hand signal for changing lanes	23%	19%
Kids dangle themselves outside vehicle windows	22%	18%
Road closure in special occasions	24%	18%

Table 3 shows that 23% of female drivers and 19% of male drivers agree with using hand as a tool for changing lanes as they describe it as a mandatory and easy tool for changing lanes. 22% of female drivers and 18% of male drivers didn't mind about that their kids

dangle themselves outside the vehicle window to have some fun. 24% of female drivers and 18% of male drivers agreed to road closure for special occasions such as wedding and graduation, as they believe that it is a way to express their happiness.

**Level Two**

The second level of analysis focused on the driving behavior differences between different age groups. For this purpose, drivers were divided into two age groups including young drivers of age 18-29 and adult drivers of age more than 30 years.

**Obeying Traffic Regulations**

Questions 1 through 12 were interested in obeying traffic regulations. The analysis was based on the participants who do not obey traffic regulations, because they represented the aggressive driving behavior. The proportion of each question was calculated for both age groups (18-29 and  $\geq 30$ ), respectively. Statistical analyses of the data were performed using two-sample

t-test at 95 percent level of confidence in order to determine whether there are any statistically significant differences between the two age groups in obeying traffic regulations. The following null and alternative hypotheses were used:

$H_0$ : the percentages of male and female drivers who don't obey traffic regulations are equal.

$H_1$ : the percentages of male and female drivers who don't obey traffic regulations are different.

Table 4 summarizes the results of comparing both age groups of drivers who don't obey traffic regulations, including the statistical analysis results shown in the rightmost column of the table.

**Table 4. Comparison between different drivers' age groups**

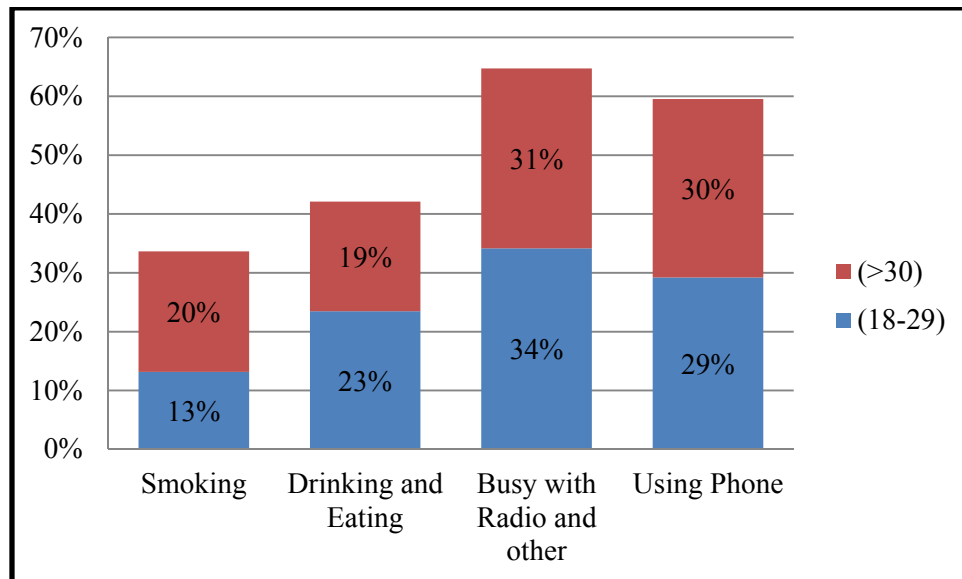
Question	(18-29) Proportion	( $\geq 30$ ) Proportion	P- value	Hypothesis Test Result
Don't obey traffic control devices	9.1%	6.2%	0.853	Fail to Reject
Don't obey the speed limit	47.7%	18.2%	1.000	Fail to Reject
Driving in the opposite direction of the road	33.6%	22.8%	0.990	Fail to Reject
Passing on road shoulder	40.6%	48.9%	0.059	Fail to Reject
Changing lanes without signaling	9.0%	5.6%	0.905	Fail to Reject
Driving in the middle between two lanes	27.1%	20.1%	0.942	Fail to Reject
Changing lanes in an inappropriate way	36.0%	26.5%	0.060	Fail to Reject
Flashing high beams at other drivers	72.2%	59.6%	0.993	Fail to Reject
Gap acceptance	24.3%	23.2%	0.001	Reject
Location for stopping to turn	21.4%	16.8%	0.954	Fail to Reject
Tailgating	21.1%	12.7%	0.985	Fail to Reject
Not following parking rules	20.0%	18.1%	0.651	Fail to Reject

From a statistical point of view, it was generally concluded that drivers' age doesn't affect how drivers behave on the road network. Thus, there were no significant differences among different drivers' age groups. But, it can be seen that young drivers have a higher tendency to generally not obeying traffic

regulations.

**In-Vehicle Behavior**

Question 13 was analyzed. Figure 3 shows the proportions of some habits inside vehicles for both drivers' age groups while driving.



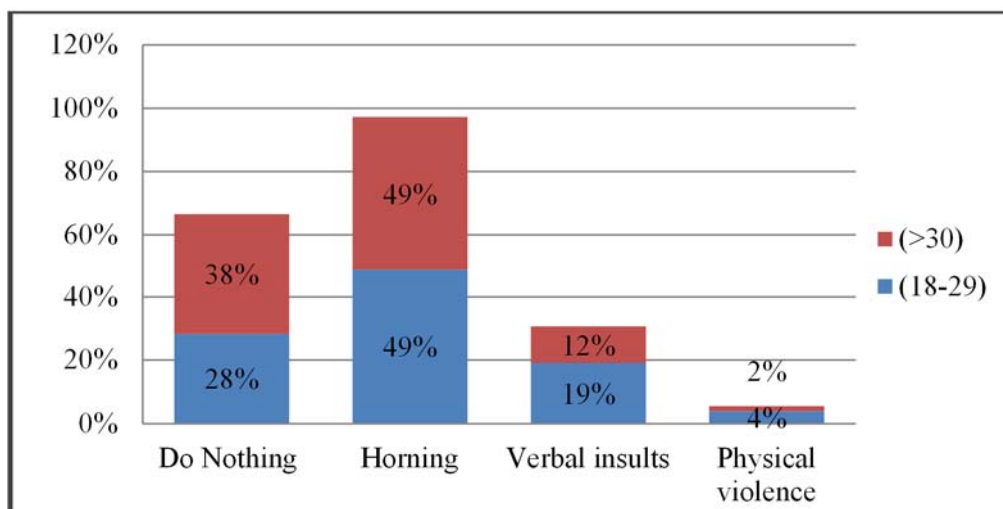
**Figure (3): In-vehicle behavior based on age**

It can be seen from the data that there are no behavioral differences between both age groups while driving. It was found that 3% of young drivers compared to 20% of adult drivers smoke while driving, 23% of young drivers compared to 19% of adult drivers drink and eat while driving, 34% of young drivers compared to 31% of adult drivers get busy with radio while driving

and almost 30% of young and adult drivers use mobile phone while driving.

**Drivers’ Reactions When Facing Road Problems**

Question 14 was analyzed. The proportions of drivers’ reactions for both age groups are shown in Figure 4.



**Figure (4): Drivers’ reactions while facing road problems based on age**



Figure 4 shows that 28% of young drivers compared to 38% of adult drivers prefer to keep silent and continue their journey, while equal percentage of 49% of young and adult drivers will use vehicle horn. Also, it was found that 19% of young drivers will become angry and use verbal insults compared to 12% of adult drivers and 4% of young drivers will use physical violence compared to 2% of adult drivers.

**Drivers’ Opinions about Some Unsafe Behaviors in Jordan**

Question 15 in this research was asked to determine the drivers’ opinion about several unsafe behaviors in Jordan. Table 5 presents the proportions of young and adult drivers who believe that these behaviors would not negatively affect traffic safety.

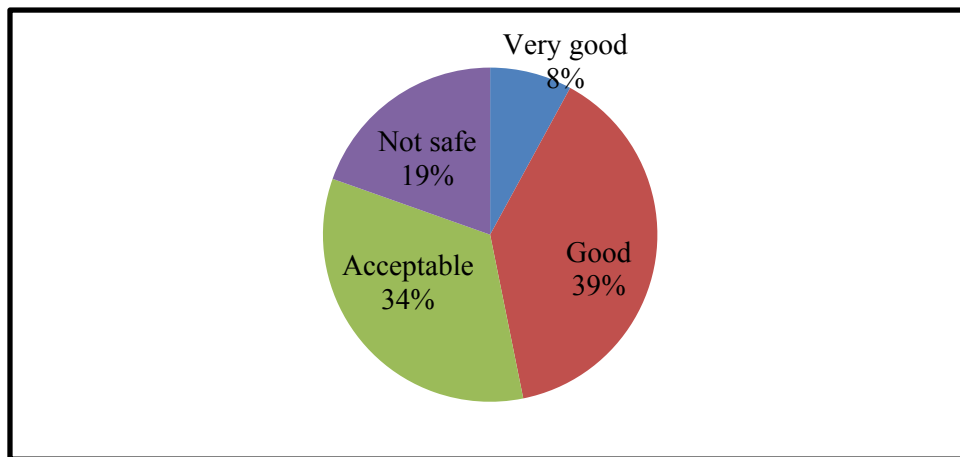
**Table 5. Drivers’ opinions about some unsafe driving behaviors in Jordan**

Is this act dangerous?	Percentage of whom saying yes	
	(18-29)	(≥30)
Using hand signal for changing lanes	20%	21%
Kids dangle themselves outside vehicle windows	19%	20%
Road closure in special occasions	27%	18%

It can be seen that 20% of young drivers and 21% of adult drivers agree with using hand as a tool for lane changing. 19% of young drivers and 20% of adult drivers do not mind about that their kids dangle themselves outside the vehicle window as a way to have some fun. 27% of young drivers and 18% of adult drivers agreed to road closure for special occasions such as wedding and graduation, as they believe that it is a way to express their happiness.

**Road Safety Level in Jordan**

In question 16, drivers were asked to rank road safety level in Jordan on a scale ranging from very good to not safe. Figure 5 illustrates drivers’ evaluations on road safety level. It can be seen that only 8% of drivers consider safety level very good, 39% consider it good, 34% ranked it acceptable and 19% evaluated it not safe at all.



**Figure (5): Road safety level in Jordan**

### Reasons for Aggressive Driving in Jordan

In question 17, drivers were asked about their opinions about the reasons for aggressive driving in Jordan. Most drivers related aggressive driving behavior to the driver's lack of knowledge in traffic regulations, lack of police enforcement, ethics of drivers, impatience of drivers on roads, congestion, road conditions and taking driving license in an illegal way.

### CONCLUSION

The main objective of this study was to develop a clear understanding of the current driving behaviors in Jordan based on the socio-characteristics of drivers. Data needed for this study was obtained from a survey questionnaire. Specific unsafe driving acts were examined in the questionnaire. It included a total of seventeen questions, twelve of which were related to drivers obeying traffic regulations, one question was about in-vehicle driver behaviors including smoking, drinking and eating, getting busy with the radio and talking or texting on the phone, one question was based on drivers' opinions about several road issues, one question was interested in drivers' opinions about unsafe behaviors, one question was asking about the road safety level in Jordan and one open ended question was aimed to determine the reasons of aggressive driving behaviors in Jordan.

The results were analyzed in two levels. The results were categorized based on gender in the first level of analysis, while the results were categorized based on two age groups in the second level of analysis. The proportions of each question were found using MS excel sheets, then the results were exported from the excel sheets to the Statistical Package for Social Sciences,

Version 19 (SPSS 19) software. Two-sample t-test was used to find the statistical significance between two gender groups and between two age groups, respectively. The results of this study indicate that there are statistically significant differences between male and female drivers in several driving behaviors. Male drivers have a higher tendency to drive with higher speeds than female drivers; this leads to have a higher tendency to drive at the middle of two lanes, ignoring the road line. Flashing high beams at other drivers and tailgating were more popular among male drivers. Moreover, there were statistically significant differences between male and female drivers in gap acceptance and location at which drivers stop to make turn. It was found that male drivers have a higher tendency to smoke while driving than female drivers; however, female drivers tended to drink and eat, get busy with radio and use phone while driving more than male drivers. Furthermore, it was found that females have a higher tendency to blow the horn while driving than males. What is interesting in age group comparison is that drivers' ages did not affect how drivers behaved on the road network except for gap acceptance.

Finally, drivers were asked to rank road safety level in Jordan from very good to unsafe. Surprisingly, 8% of drivers considered safety level as very good, 39% scored it good, 34% ranked it acceptable and 19% evaluated it as not safe at all. Drivers were asked for their opinions about the reasons for aggressive driving behaviors in Jordan. Most drivers linked aggressive driving behaviors to lack of driving knowledge in traffic regulations, lack of police enforcement, ethics of drivers, impatient drivers on roads, congestion, road conditions and obtaining a driving license in an illegal way.

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