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Factors and motives of unsafe behaviors of road users [1]

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Abstract. A questionnaire to measure factors and motives of unsafe behaviors of road users was constructed. This study tool was applied on a final sample of 5586 drivers in twelve out of forty eight districts in Algeria. The aim of the present study was to sort out the different factors and motives that make road users opt for the unsafe behaviors. The latter were determined mainly on the results of a previous study carried out on a final sample of 7058 drivers in twelve out of forty eight districts in Algeria in order to find the most frequent and dangerous unsafe behaviors of road users. The main unsafe and dangerous behaviors were then used in the present study. Friedman ranking means test was applied to rank the factors and motives selected under each unsafe behavior of road users. The whole results were summarised in seven axes of factors and motives causing: dangerous manoeuvrings by drivers, aggressive behaviors by drivers, negligence and ignorance of maintenance principals by drivers, lack of responsibility and engagement by drivers, cyclists and motorcyclists and their companions, as well as pedestrians and workers of road maintenance. The results are discussed in view of the previous studies and many recommendations have been made.

Keywords: unsafe behavior, Factor, motive, Road users, Road accidents.

1. Introduction

Despite the mobilization of many official and unofficial institutions to increase consciousness about the danger of road in order to promote public awareness about education and culture of road safety, and despite the introduction of two new rigorous laws in 2004 & 2009, as well as the execution of the technical control on vehicles, the number of road accidents and its victims are increasing as is shown in table1. This situation has become a dilemma for the Algerian government especially with the big increasing number of vehicles and fast developments and changes that Algeria is going through, so this growing problem is not limited only to the number of injured and victims, but also has its drawbacks on the economical and social activities in general and the control of road traffic in particular.

In the same context, a previous study [4] found that 92.5% of drivers explain the non respect of traffic law by the lack of road education and culture, and 86.4% relate it to the lack of learning to drive, while 85.9% refer to the fact that the drivers rely on their personal relation to escape from sanction. This attitude is also confirmed by 85.2 % of individuals of the study sample who point out the lack of rigorous application of sanctions on drivers who do not respect the Highway Code. In addition, 84.5% referred to drivers risk taking and adventures, 75.9% believe that the traffic law will never be applied, while 75.2% think that there will be a kind of tolerance according to the social status of the driver, the sex and the type of the vehicle. The question should therefore be raised on what are the factors and motives of unsafe

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behaviors of road users? To answer this question one needs to know or determine what are called unsafe behaviors of road users in a scientific way before looking for the factors and motives behind them.

One recent study [5] used a check-list of 150 items to measure unsafe behaviors of road users based on the third person principle. This study tool was applied on a final sample of 7058 drivers in twelve out of forty eight districts in Algeria. Subjects were asked to mark both the frequency and the degree of danger of each behavior (item) on two different scales of five points. The results were used to classify the 150 items in descending order in terms of their means for their frequency and their degree of danger. It was found that the frequencies of unsafe behaviors are not limited to the driver only, but expanded to cover all road users. It was concluded from the high values of means that drivers realise the danger of unsafe behaviours well, despite the fact that they do not respect the traffic rules and laws in reality. Moreover, to combine the frequency and the degree of danger, the results were treated by using a syntax program on the SPSS package to develop a matrix of nine categories of road users' behaviors after reducing the results on both scales to only three points for each. It was then possible to obtain the distribution of all these behaviors on the nine combinations of the matrices, but most items that had high scores were mainly on the following three categories:

1. Frequent and dangerous behaviors,
2. Average frequent and dangerous behaviors
3. Less frequent and dangerous behaviors.

An other study found that the problem of road safety depends on changing dangerous behaviors of drivers [8] and this change depends itself on the awareness and perception of those drivers of all dangers of road and driving, and that this awareness represents a principle condition for safe behavior in traffic movement in the society [11]. It has also been indicated that such unsafe or dangerous behaviors are only social positions that were not a good stimulus to these behaviors as it is related in strong relation with social environment to which the individual belongs and lives [1].

2. Method

2.1. Study Tool

A questionnaire to measure factors and motives of unsafe behaviors of road users was constructed. This study tool was applied on a final sample of 5586 drivers in twelve out of forty eight districts in Algeria.

Table 1
Statistics of the corporal accidents in four years.

years / Type of damage	2005	2006	2007	2008	2009	2010
Corporal accidents	39233	40885	41175	42673	41224	32873
injured	58082	60120	61139	64708	64979	52435
Victims	3711	4120	4177	4422	4607	3660
Children playing on the road or near by is due to:			Never	Seldom	Some times	Most times	Always
Non perception of danger					X		
Absence of space for playing							X
Absence of parent' role						X	
Lack of general education							X
Carelessness					X		
Imitation of adults					X		

Twenty nine unsafe behaviors were selected to be used in the present questionnaire after many pilot studies. In this present paper only thirteen unsafe behaviors will be dealt with as examples. Each unsafe behavior selected was followed by a number of different factors and motives as items used after carrying a series of interviews among drivers as well as a preliminary study, in which an open choice question was added to give subjects the chance to add other factors or motives they thought were behind each behavior. Subjects were asked to mark their choice for each item on a five points scale (never, rarely, sometimes, most times, always). The following example shows factors and motives which make children play in the road or near by.

2.2. Procedure

Twelve out of 48 districts were chosen according to their order based on percentages of corporal accidents committed to the number of vehicles in each district. The geographical distribution was also taken into consideration by selecting each first three districts from the east, middle, west and south of Algeria in order to have a distribution representing these different regions by choosing districts which do not share the same border to obtain a representative distribution of each region. Moreover, the means available and the time allocated to this study were taken into consideration. Thus, the whole sample of the study was limited to 6000 drivers distributed over the twelve districts. The number of individuals of the

sample for each district was then sorted out by dividing the number of the whole sample by the whole number of corporals accidents multiplied by the number of accidents committed in each district. The questionnaire was written recto-verso in Arabic and French to make it easier for drivers to answer it with the language they master better. It should pointed out that factors in tables 3 to 15, will be written in Italic

2.3. Distribution of the Questionnaire

6000 Questionnaires in total were distributed over the twelve districts as mentioned above and as shown in table: 3. In addition, a number of questionnaires were added to each district to compensate any expected lost or not valid ones during the application of the study, so the final number distributed were 6470 questionnaires (see table: 2). Their distribution was carried out mainly by postgraduate students, but also under graduate students studying in psychology or sociology under the supervision of professors or assistant professors and all of them were from the concerned district. They were all paid for this task. These applicants scattered in places where drivers are expected to have free time to answer the questionnaires; mainly bus and taxis stations, vehicles insurance companies, vehicles' technical control stations and workshops for maintenance and reparations.

Table 2
Choice and Distribution of the Questionnaire

districts	Park auto	Accidents	Acci-dent/Park	Sample sorted	Distributed	Retrieve	Valid
Alger	812750	3425	0.42	1320	1350	179	1171
Sétif	60762	2152	3.54	829	900	186	714
Telemcen	101958	1560	1.53	601	620	58	562
Oran	180966	1357	0.74	523	550	43	507
Oumelbouaki	25997	1234	4.74	476	500	127	373
Chlef	77264	1121	1.45	432	450	44	406
Bouira	66830	1065	1.59	410	500	24	476
Médéa	71771	963	1.34	371	400	101	299
Biskra	44662	939	2.10	362	450	33	417
Annaba	87874	723	0.82	279	300	31	269
Ourgla	47632	696	1.46	268	300	36	264
Béchar	19457	336	1.72	129	150	22	128
Total	1597923	15571	21.45	6000	6470	884	5586

2.4. Statistical Technique Used

The Statistical tests used in the present study are:

- Means and standards deviations to distribute the frequency factors or motives of unsafe behaviors of road users.
- Friedman ranking means test was applied to rank the factors and motives selected under each unsafe behavior of road users
- The chi-square (χ^2) was also used to find out whether there are differences between subjects in their reaction to each item.

3. Results

3.1. Axe one: Factors and motives causing dangerous maneuverings by drivers

It can be noticed from table 3, that there are many motives behind the unsafe behavior of overtaking in an unauthorized place. They indicate behaviors of risk taking and sensation seeking, in addition to few factors which do not seem to be objective, but rather as excuses as far as overtaking is not allowed in these places. However, this does not exclude the remainder of these factors like traffic jam and bad road design which may well contribute to the appearance of this unsafe behavior. It is therefore necessary to work on the best organization of the high way traffic movement besides applying scientific norms of road design and raising the level of awareness and road education.

Table 3
Factors and motives behind overtaking by a driver in non authorised place

Overtaking by a driver in non authorised place is due to:	Mean	SD	Rank Means
Over self confidence in the control of the vehicle	3,57	1,091	11,66
Anxiety	3,51	1,074	11,34
Non perception of danger	3,46	1,151	11,16
Saving time	3,49	1,206	11,13
The power and the type of vehicle	*3,43*	*1,114*	10,88
Traffic jam	*3,39*	*1,091*	10,64
Impulsion	3,35	1,083	10,57
Imitation of other drivers	3,27	1,076	10,18
An irrational decision	3,29	1,189	10,18
Slowdown of vehicles in the front	*3,27*	*1,015*	10,12
Rebellion	3,24	1,129	10,07
Bad road design	*3,22*	*1,123*	9,90
Self affirmation	3,19	1,239	9,78
Stress of other drivers	3,09	1,066	9,17
Believing in luck	3,01	1,194	8,88
Ignorance of the traffic law	2,96	1,212	8,83
Unrealistic optimism	2,99	1,154	8,77
Minimising the danger of having an accident	2,87	1,294	8,53
The wrong explanation of the traffic law	2,85	1,178	8,22

It appears from the results in table 4, that there is a big series of motives related to the unsafe behavior of

making dangerous manoeuvrings by drivers, which is headed by the motive of the weak perception and evaluation of the situation, followed by other motives like showing courage, exhibition of abilities in driving or saving time, ..etc, which emphasis the appearance of risk taking behaviors among drivers besides the coexistence of some negative social attitudes and beliefs that may help the appearance of this behavior, like attracting attention of others. Let alone the so many different factors that may strongly contribute in pushing the driver for risk taking when what might be imposed by the traffic jam and bad design of the road and its narrowness, and what could results from it as behaviors and stresses among drivers, besides the lack of strict application of traffic law.

Table 4
Making dangerous manoeuvrings by a driver

Making dangerous manoeuvrings by a driver is due to:	Mean	SD	Rank Means
Weak perception and evaluation of the situation	3,50	1,042	14,09
Intransigence	3,51	1,083	14,04
Believing that traffic signals are not objective	3,49	1,082	13,99
Showing courage	3,47	1,086	13,89
Exhibition of driving competencies	3,47	1,101	13,89
Saving time	3,46	1,159	13,85
Lack of strict application of traffic law	*3,43*	*1,088*	*13,63*
Attracting attention of others	3,38	1,080	13,16
Over self confidence in the control of the vehicle	3,37	1,068	13,10
Rebellion	3,32	1,124	12,86
An irrational decision	3,32	1,224	12,84
Bad organization of traffic movement	*3,28*	*1,054*	*12,64*
Bad road design	*3,21*	*1,099*	*12,27*
Slowdown of vehicles in the front	*3,24*	*1,005*	*12,27*
Stress of other drivers	3,19	1,027	11,93
Lack of awareness and road education	*3,17*	*1,133*	*11,78*
Self affirmation	3,15	1,255	11,77
Narrowness of the road	*3,16*	*1,059*	*11,75*
Aggression	3,16	1,143	11,65
Fatigue	3,07	1,091	11,34
Believing that that traffic signal are non objective	3,03	1,153	11,18
Believing in luck	3,06	1,168	11,16
Unrealistic optimism	3,02	1,153	10,98
Minimising the danger of having an accident	2,75	1,309	9,92

3.2. Axe Two: Factors and motives causing aggression by drivers

It can be concluded from table 5 & 6, that most motives point to the social side which is related to predominant bad attitudes, beliefs, habits and customs headed by the lack of civism in the society, that relies on the use of force when dealing with other road users. This thing might be behind the emergence of the aggressive as well as risk taking behaviors among drivers of buses and lorries in particular and other drivers in general. In addition to an important series of factors which might reinforce these behaviors, especially the lack of tolerance and cooperation among drivers, the power and the type of vehicle, lack of strict application of traffic law, bad organization of traffic movement and narrowness of the road. Hence, there is an absolute need to work on raising the level of civic sense, of civilised behaviors le level of tolerance and cooperation among drivers, as well as getting rid of many bad and negative attitudes in driving, meanwhile enhancing and developing positive values with the reduction of the degree of selfishness and aggression.

Table 5
A bus or lorry driver who threaten a car

A bus or lorry driver who threaten a car is due to:	Mean	SD	Rank Mean
Lack of civism	3,62	1,080	9,05
Lack of tolerance and cooperation among drivers	*3,56*	*1,053*	*8,77*
Looking down among drivers	3,50	1,054	8,59
Aggression	3,47	1,112	8,48
The power and the type of vehicle	*3,44*	*1,072*	*8,30*
Carelessness	3,41	1,041	8,20
Non respect of other road users' right	*3,40*	*1,059*	*8,14*
Lack of strict application of traffic law	*3,39*	*1,095*	*8,11*
Bad organization of traffic movement	*3,30*	*1,051*	*7,76*
An irrational decision	3,28	1,206	7,72
Narrowness of the road	*3,24*	*1,091*	*7,56*
Selfishness	3,25	1,172	7,52
The wrong explanation of the traffic law	3,17	1,132	7,38
Self affirmation	3,15	1,234	7,25
As a reaction to other drivers' behaviours	*3,15*	*1,072*	*7,13*

Table 6
Incursion of a driver in a lane by force is due to:

Incursion of a driver in a lane by force is due to:	Mean	SD	Rank Means
Non perception of danger	3,54	1,118	8,92
Over self confidence in the control of the vehicle	3,54	1,039	8,83
Carelessness	3,50	1,031	8,67
Lack of tolerance and cooperation among drivers	*3,48*	*1,030*	*8,64*
Traffic jam	*3,45*	*1,048*	*8,46*
The power and the type of vehicle	*3,42*	*1,042*	*8,39*
Selfishness	3,43	1,082	8,36
Lack of strict application of traffic law	*3,41*	*1,097*	*8,25*
Opportunism	3,40	1,029	8,22
An irrational decision	3,39	1,151	8,17
Believing in luck	3,19	1,137	7,46
Selfishness	3,18	1,198	7,40
Unrealistic optimism	3,09	1,114	6,98
The wrong explanation of the traffic law	*3,01*	*1,166*	*6,75*
Minimising the danger of having an accident	*2,84*	*1,304*	*6,51*

3.3. Axe three: Factors and motives causing negligence and ignorance of maintenance principals by drivers

Although, the results in tables 7 & 8, showed very logical factors to a certain extent as far as it reflects the economical, social, and cultural difficulties that face the Algerian individual when he owns a vehicle and what follows that such as maintenance expenses that are beyond his financial means, it can also be extracted that the behavior of carrying a load not fixed or covered and driving a vehicle despite the coexistence of a mechanical defect are related to a big series of motives that reflect the whole unsafe behaviors which indicate the lack of road safety education among drivers together with the coexistence of a few contributory factors for the development of this phenomenon, as it is the case for lack of strict application of traffic law, the insufficient coexistence of the public order agents on the road, lack of material means and especially the ignorance of traffic law. It is therefore necessary to raise the driver' awareness about the effect and danger of all these types of unsafe behaviors and intensifying control of this kind of infringement in order to change the motives and factors behind negligence and ignorance of all types of maintenance principals.

Table 7
Driver carrying a load not fixed or covered

driver carrying a load not fixed or not covered is due to:	Mean	SD	Rank Mean
Negligence	3,68	1,063	10,88
Carelessness	3,63	1,078	10,63
Non perception of danger	3,50	1,132	10,22
Impulsion	3,45	1,107	9,88
Lack of strict application of traffic law	*3,41*	*1,086*	*9,71*
An irrational decision	3,31	1,207	9,25
Expectation of non incurrence to an infringement	*3,27*	*1,072*	*9,13*
The insufficient coexistence of public order agent	*3,23*	*1,124*	*8,94*
Believing in luck	3,16	1,185	8,62
Lack of material means	*3,11*	*1,125*	*8,54*
Ignorance of traffic law	*3,09*	*1,132*	*8,45*
forgetfulness	3,08	1,134	8,41
Unrealistic optimism	3,11	1,161	8,41
Saving time	3,07	1,223	8,27
Non recognition of traffic law	*3,05*	*1,166*	*8,19*
Self affirmation	2,99	1,247	7,95
Minimising the danger of having an accident	2,82	1,310	7,53

Table 8
Driving a vehicle with a mechanical defect.

Driving a vehicle with a mechanical defect is due to:	Mean	SD	Rank Mean
High cost of spare parts	*3,56*	*1,110*	*9,27*
Carelessness	3,54	1,149	9,16
The available spare parts are not original	*3,38*	*1,090*	*8,56*
Lack of awareness and road education	*3,35*	*1,092*	*8,47*
Lack of material means	*3,31*	*1,085*	*8,22*
Bad road condition	*3,28*	*1,110*	*8,20*
Unrealistic optimism	3,29	1,182	8,19
Ignorance of the mechanical side of the car by the drive	*3,27*	*1,046*	*8,16*
Non perception of danger	3,24	1,207	8,02
Lack of training in driving	*3,19*	*1,074*	*7,84*
Time shortage	*3,10*	*1,163*	*7,60*
Believing in luck	3,11	1,185	7,53
Unrealistic optimism	3,06	1,149	7,31
Self affirmation	2,92	1,250	6,90
Minimising the danger of having an accident	2,76	1,323	6,56

3.4. Axe four: Factors and motives causing lack of responsibility and engagement by drivers

The results in tables 9 & 10, showed that there are so many different motives behind the lack of responsibility and engagement of the drivers which reflect the behavior of risk taking; the non feeling of the social responsibility in particular and the internal and external exigencies which the individual is exposed to in modern life in general, besides other factors that are not less important than those motives. They might even enhance the latter's as is the case of the factor of the power and the type of vehicle. In general, many studies have found that dangerous behaviors that are followed by drivers are referred to cultural elements learned in an indirect way, especially through the public media [6].

Table 9
Drivers exceed the speed limit.

Exceed the speed limit by drivers is due to:	Mean	SD	Rank Mean
saving time	3,57	1,206	12,77
Non perception of danger	3,51	1,160	12,71
The power and the type of vehicle	*3,54*	*1,077*	*12,71*
Pleasure and sensation seeking	3,53	1,061	12,68
Carelessness	3,52	1,095	12,55
Emptiness of the road	*3,51*	*1,119*	*12,46*
Exhibition of driving competencies	3,48	1,068	12,37
Attracting attention of others	3,48	1,070	12,34
Over self confidence in the control of the vehicle	3,48	1,078	12,32
A habit	3,44	1,021	12,05
The good knowledge of the path	*3,40*	*1,060*	*11,82*
An irrational decision	3,37	1,192	11,68
Lack of strict application of traffic law	*3,36*	*1,131*	*11,66*
Selfishness	3,35	1,096	11,61
The fact that every body drives fast	*3,31*	*1,079*	*11,33*
Selfishness	3,21	1,232	10,85
The inattention	3,22	1,072	10,83
Believing in luck	3,11	1,161	10,25
Unrealistic optimism	3,05	1,139	9,91
Non recognition of traffic law	2,99	1,204	9,70

Ignorance of the traffic law	2,93	1,167	9,36
Minimising the danger of having an accident	2,78	1,319	9,04

Table 10
Not respecting the principle of priority

Not respecting the principle of priority by drivers is due to:	Mean	SD	Rank Mean
Non feeling of the social responsibility	*3,45*	*1,091*	*11,07*
Lack of awareness and road education	*3,42*	*1,098*	*10,91*
Risk taking	*3,40*	*1,088*	*10,83*
Saving time	3,39	1,117	10,76
Selfishness	3,39	1,092	10,70
Non respect of other road users	*3,38*	*1,050*	*10,67*
Rebellion	3,33	1,087	10,52
The wrong explanation to the right of priority	*3,33*	*1,055*	*10,47*
The application of the priority to the strongest	*3,27*	*1,154*	*10,23*
An irrational decision	3,28	1,175	10,09
Difficulty in applying principle of priority in reality	*3,24*	*1,142*	*10,01*
Tolerance of the public order agent	*3,20*	*1,079*	*9,74*
Self affirmation	3,16	1,216	9,58
Non existence of suitable traffic signals	*3,10*	*1,148*	*9,31*
Believing in luck	3,10	1,184	9,27
Non recognition of traffic law	*3,09*	*1,157*	*9,24*
Ignorance of the traffic law	*3,06*	*1,163*	*9,13*
Unrealistic optimism	3,06	1,175	9,12
Minimising the danger of having an accident	2,83	1,275	8,35

3.5. Axe five: Factors and motives causing lack of responsibility and engagement by cyclists and motorcyclists and their companions

As can be noticed from table 11 & 12, there are various factors and motives behind unsafe behaviors of cyclists and motorcyclists and their companions. It seems that factors are well classified in this axe, which reflects the existence of lacking at many levels especially the non existence of a special path for them as a result of not taking this type of road users into consideration by road designers, besides the legislative gap concerning this category. This matter might pave the way for the development of the various motives shown in tables 11 & 12. However, this thing should not be an excuse for not respecting the high way code. It has even been found that some of the motorcyclists believe that there is a mysterious force that protects them and that's why they go for risk taking behaviors [6]. Hence, there is a need to work on raising their awareness and making them obey the safety rules of the high way code by intensifying the operations of awareness and road education as well as the strict application of traffic law on this category of road users, and why not the introduction of some adjustment on traffic law to cover any gaps related to this type of road users.

Moreover, It should be pointed out that this type of road users is usually limited to the category of youth and all what is related to it from unsafe behaviors like non perception of danger, especially when they are too young or did not have any training, which should be the responsibility of parents who buy these things for them and let them die on the road.

Table 11
Factors and motives that make cyclist and motorcyclist or their companions not wearing helmet.

Not wearing helmet by cyclist and motorcyclist or their companions is due to:	Mean	SD	Rank Mean
Carelessness	3,64	1,088	10,49
Lack of awareness and road education	*3,51*	*1,106*	*9,98*
Non perception of danger	3,49	1,141	9,90
Lack of strict application of traffic law	*3,50*	*1,121*	*9,87*
Showing courage	3,45	1,131	9,79
Lack of training in driving	*3,37*	*1,110*	*9,39*
Audacity	3,39	1,222	9,35
An irrational decision	3,37	1,199	9,33
Tolerance of the agent of order	*3,27*	*1,093*	*8,85*
Ignorance of the traffic law	*3,18*	*1,199*	*8,70*
Self affirmation	3,17	1,267	8,55
Rebellion	3,17	1,195	8,50
The non recognition of the high way code	3,14	1,189	8,36
Believing in luck	3,09	1,191	8,23
Saving time	3,02	1,306	8,17
Unrealistic optimism	3,08	1,165	8,14
Minimising the danger of having an accident	2,79	1,354	7,39

Table 12
Ccyclists and motorcyclists or their companions not respecting the high way code.

Not respecting the high way code by cyclist and motorcyclist or their companions is due to:	Mean	SD	Rank Mean
Non existence of a special path for them	*3,61*	*1,140*	*9,12*
Carelessness	3,58	1,093	9,04
Lack of strict application of traffic law	*3,53*	*1,105*	*8,87*
Lack of awareness and road education	*3,48*	*1,080*	*8,63*
Selfishness	3,40	1,270	8,37
Lack of training in driving	*3,37*	*1,092*	*8,17*
Saving time	3,33	1,162	8,15
An irrational decision	3,32	1,215	8,03
Ignorance of the traffic law	*3,23*	*1,160*	*7,82*
Rebellion	3,24	1,197	7,71
Self affirmation	3,21	1,242	7,67
The non recognition of the high way code	3,21	1,170	7,60
Believing in luck	3,11	1,171	7,24
An irrational decision	3,05	1,146	6,97
Minimising the danger of having an accident	2,84	1,313	6,61

3.6. Axe six: Factors and motives causing lack of responsibility and engagement by pedestrians

It can be noticed from tables 13 & 14, that there are various different motives and factors behind the unsafe behaviors of pedestrians, things that need intervention on many levels either by campaigns for awareness' raising in order to change wrong attitudes and beliefs acquired by pedestrians, or the role of the road designers in taking the necessary precautions either by giving pedestrian their right on the road or by putting design measures that could orient or direct their behaviors to use different pedestrian crossing as far as they rely on behavior of risk taking to cross the road and justify that by non objective excuses. In addition to the intervention of the legislature to introduce relevant laws that enforce the legislatives infringements that go with the degree of danger of behaviors for this category of road users.

It has been found that those pedestrians are more exposed to road accidents and that 41% to 75% of the total death among road users in the urban region are pedestrians [12]. Indeed, all factors and motives in tables 13 & 14, illustrate the vulnerability of pedestrians because of bad road design, absence of oriental barriers for them and especially ignorance of the traffic law, tolerance of the agent of public order and lack of awareness and road education. It is therefore expected to see the propagation of so many bad motives which help the appearance of unsafe behaviors among this type of road users. Hence, applying the ergonomics principles in the design of the road in general and the pavement in particular could not just direct the crossing and minimise unsafe behaviors of pedestrians, but also make life easier for so many other road users like those who need a daily use of wheelchairs or pushchairs. It is therefore possible to take into consideration all categories of road users with their own particularities not only as their right but also to avoid any conflict and especially to prevent road accidents and reduce the number of victims.

Table 13
Pedestrians crossing the road without respecting the orientation of the public order agent.

Pedestrians crossing the road without respecting the orientation of the public order agent	Mean	SD	Rank Mean
Lack of strict application of traffic law on pedestrians	3,61	1,117	10,30
Difficulty in punishing them	*3,52*	1,129	*9,88*
Carelessness	3,47	1,055	9,63
Lack of awareness and road education	*3,45*	1,058	*9,51*
saving time	3,43	1,122	9,50
Traffic jam	*3,43*	1,067	*9,48*
Over self confidence	3,42	1,033	9,35
Not paying attention	3,40	1,032	9,32
An irrational decision	3,35	1,180	9,07
Absence of oriental barriers for pedestrians	*3,34*	*1,054*	*9,01*
Bad organization of traffic movement	*3,29*	*1,026*	*8,81*
Selfishness	3,27	1,095	8,69
A habit	3,25	1,162	8,53
Too many pedestrians on the pavement	*3,21*	*1,112*	*8,37*
Self affirmation	3,13	1,205	8,13
Bad road design	*3,14*	*1,096*	*8,11*
Minimising the danger of having an accident	2,86	1,302	7,33

Table 14
Pedestrians crossing the road carelessly.

Crossing the road by pedestrian carelessly	Mean	SD	Rank Mean
saving time	3,56	1,155	11,45
Carelessness	3,59	1,087	11,45
Non perception of danger	3,53	1,134	11,28
Lack of strict application of traffic law on pedestrian	3,55	1,150	11,28
Over self confidence	3,49	1,068	10,97
Weak perception and evaluation of the situation	3,41	1,051	10,51
Lack of concentration and attention	3,41	1,039	10,50
Absence of oriental barriers for pedestrians	3,40	1,069	10,48
Imitation of other pedestrians	3,39	1,073	10,45
A habit	3,34	1,195	10,10
An irrational decision	3,31	1,197	10,10
Too many pedestrians on the pavement	3,27	1,123	9,90
Bad road design	3,26	1,094	9,78
Ignorance of the traffic law	3,23	1,165	9,70
Believing in luck	3,07	1,215	8,94
Selfishness	3,07	1,136	8,93
Self affirmation	3,05	1,222	8,86
Minimising the danger of having an accident	2,75	1,276	7,81
Unrealistic optimism	2,81	1,150	7,53

3.7. Axe seven: Factors and motives causing lack of responsibility and engagement by workers of road maintenance

It can be noticed from table 15, that there are many different motives behind not repairing the road. Most of them are related to work incentive for maintenance workers, the different sides of training and the lack of awareness about the importance of respecting the norms of road maintenance and work perfection, besides the weak level of taking full social and vocational responsibility by these workers. This matter needs rethinking about manners to raise the level of motivation and developing the feature of belonging to the institution. As for the factors, they seem to point out the organisational side of maintenance operation which require raising the level of competence among the staff in charge of maintenance in the field of communication and management of human and mate-

rial resources, in addition to providing the necessary means, choosing the right time for intervention and respecting the norms and principles of road maintenance including the quality of materials used.

Table 15
Factors and motives that make maintenance workers not repair the road.

Not repairing the road by maintenance workers is due to:	Mean	SD	Rank Mean
Carelessness	3,61	1,163	11,09
Negligence	3,63	1,155	11,07
Absence of coordination between concerned services	*3,60*	*1,079*	*11,07*
Not respecting maintenance' norms	3,50	1,108	10,61
Bureaucracy	*3,47*	*1,200*	*10,56*
Lack of skilled workers	*3,36*	*1,143*	*9,98*
Non perception of danger	3,33	1,212	9,96
Lack of training	*3,28*	*1,117*	*9,72*
Traffic jam	*3,24*	*1,226*	*9,65*
An irrational decision	3,26	1,246	9,56
No respect to the right of the rest of road users	3,23	1,154	9,36
The Stress of the rest of road users	*3,15*	*1,106*	*9,19*
Lack of human and materials means	*3,05*	*1,273*	*8,99*
Lack of the will to work	3,06	1,185	8,47
A lot of work	*2,93*	*1,213*	*8,40*
Minimising the danger of having an accident	2,88	1,321	8,23
Not providing security outside working hours	*2,86*	*1,209*	*7,75*
Time Shortage	*2,66*	*1,232*	*7,34*

4. Discussion

It can be noticed that factors and motives are different from one unsafe behavior to another and that even the rank means of the same factor or motif changes from one unsafe behavior to another. Moreover, although most unsafe behaviors are affected by both factors and motives, it is clear that some of them are mainly affected by factors while others by motives. Perhaps, what might be the most important thing shown by the results of the present study is that each unsafe behavior is affected by so many factors and motives which go well with the system approach that relies on the interaction of many factors that cause accident injuries. It is now known that accidents are the results of the interaction between many factors and that errors committed by the road users are only part of these factors.

Furthermore, it seems that there are so many factors which are supposed to play the role of normotive control of behavior as is the case for the lack of strict application of traffic law, the insufficient coexistence of public order agent, non existence of suitable traffic signals, traffic jam and absence of oriental barriers for pedestrians. They became as incentives for the emergence of many motives, if not originally behind their appearance, or in other word to prepare the suitable environment for them. This was named by many researchers as beliefs about the existence of some factors that may facilitate or complicate the performance of certain behaviors which were called by some researchers control beliefs [2, 3, 9, 7].

Hence, it can be concluded that it is possible to change or direct unsafe behaviors of road users by various means or strategies and through different stages. For example, improving conception of pavement and pedestrian crossings and adapting them to the required norms may well convince at least the majority of them to use these facilities in the appropriate way. The same thing could be done for drivers by good conception of road and traffic signs...etc.

Moreover, It is useful to emphasize on the importance of time and develop its management in the field of road traffic, as well as to take all necessary actions to promote road traffic system by appropriate planning of roads and introducing all different traffic signs and facilities especially those concerning the urban transports which might insure flexibility in the flow of traffic. This can make road users regain self-confidence to arrive to their target in a reasonable time.

There is a necessity to good and effective organisation of road traffic, adaptation of economical trade and social activities and the organisation of working hours with the necessary fluidity of road traffic in order to create and prepare the suitable environment for the application of traffic law and its effective incorporation in reality [8]. Modern methods and means should also be used to pass on the message of the high way code to all road users by convincing them that the law and policemen are there to protect them [10].

Finally, It seems that the best way to promote safe behaviors is the need to work on the best improvement of factors that were found behind so many unsafe behaviors like the lack of strict application of traffic law, bad road design, and therefore, applying the ergonomics principles in the design of the road in general and the pavement in particular, but also trying as much as possible to adjust most road structure to the daily local needs of all different road users taking into account their culture, social beliefs, habits, security, in addition to, environmental, economical, regional and social situations.

For example, before thinking about the design or redesign of any sort of pedestrian crossings, the road designer may need to carry a small study to know the

characteristics of pedestrians who will use it together with their economical and social activities. It is therefore necessary to find out whether to opt for a foot bridge and what kind of foot bridge? Will it be suitable for all pedestrians? Can old people, people with wheelchairs or pushchairs use it easily? Would it be better to opt for a subway or a tunnel? And will all of them be safe to use? Most important of all will people use it or will they prefer to take the risk and cross the few meters of the road instead of using any type of pedestrian crossings? Perhaps the designer could opt for another solution, like a tunnel or bridge for vehicles and leave the straight way for pedestrians.

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