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MEASURING THE PERCEPTION OF MEN AND WOMEN DRIVERS AMONG YOUNG ADULTS

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Abstract
Gender differences in driving accidentology are actually particularly explained in the literature by the conformity to gender stereotypes, notably the association of risk-taking with social expectations concerning masculinity. To date, no research was interested in the effect of the perception of men and women drivers (PMWD) on driving behaviors. The aim of this research was to create a questionnaire measuring PMWD among young French adults. The PMWD was measured on 108 participants (33 men and 75 women), from 18 to 29 years old. Principal component analyses indicated that the organization and content of the perception of men drivers differed from the organization of the perception of women driver. The results are discussed in terms of in-group/out-group relations in the PMWD.

Key words: perception, gender, driving, questionnaire

1. INTRODUCTION

Worldwide, men are involved in about three more crashes than women and young men are over-involved in these crashes (*1*). In 2007, for the same number of kilometers, French male drivers were nearly four times more likely to death, two times more likely to be injured, and twelve times more likely to be sentenced for driving offenses than women (*2*). Men drivers reported more driving injury risk behaviors (*3*) and more traffic offenses (*4*). This sex difference is actually explained by sex and gender of individuals. Gender refers to characteristics and traits which are culturally associated to men and women (*5, 6*) whereas sex refers to biological and physiological differences between them.

Sex is a predictor of driving accident (*7*). Indeed, compared to women and whatever their age, men reported more driving injury risk behaviors (*3*), more violations and errors on the road (*8*), and higher scores on perceptual motor skills which are positively related to traffic accidents (*7*). In contrast, women reported more harmless lapses than men (*8*), and higher scores on safety skills which are negatively related to traffic accidents (*7*).

From another side, risk-taking has a greater social value for men than women. Masculinity is indeed stereotypically associated with risk-taking (*9, 10, 11*) whereas femininity is stereotypically associated with careful behaviors. In this way people adhering to masculine traits would have more risky practices than people adhering to feminine traits (*12*). Furthermore, studies show that in driving, high masculinity is associated with a high level of offenses, aggressive violations, ordinary violations, accidents, perceptual motor skills, and low inattention and inexperience errors (*7, 13, 14*). This association between masculinity and perceptual motor skills suggests that "being a skillful driver is seen as a masculine trait" (*7*). In contrast high level of femininity is associated with high safety skills, few accidents, offenses, and aggressive and ordinary violations, and with low inattentions, dangerous and inexperience errors and ordinary violations (*7, 13, 14*). Finally masculinity among French pedestrian adolescents brings to a lower internalization of traffic rules and both are good predictors of declared risky behaviors (*15*).

Gender seems to be a better predictor of risk-taking than biological sex. Furthermore, for several years studies are interested in gender stereotypes associated with driving and their implications. The stereotype of women drivers is that they are unable to manage stress when a quick decision is needed (*16*). Moreover in stereotypes definitions women have to be passive, uncompetitive, and no risk takers whereas men are encouraged to be aggressive and risk takers which lead them to commit more traffic offenses (*3*).

In France, Granié and Papafava (*17*) explored the gender stereotypes associated with driving among French adolescents from 10 to 16 years old. Thereby they showed that adolescents define men drivers as skillful, involved in an activity consistent with their social roles although imprudent and committing more traffic offenses. In contrast they defined women drivers as careful, compliant with traffic rules and having less accident although being unskilled, having a lot of accidents, and involved in an activity inconsistent with their social roles. They also showed that the stereotype of men driver is stable from 10 while the stereotype of women driver appears to strength with age.

Based on this study, Degraeve, Granié, and Pravossoudovitch (*18*) analyzed the contents of gender stereotypes associated with driving among French adults (from 16 to 50 years old and over). They showed that people see men drivers as skillful although impatient, reckless, uncivil, committing offenses, and driving too fast while they see women drivers as civic, careful, vigilant, and conforming to traffic rules although unskilled, dangerous, inattentive, and driving slowly.

Based on this study on gender stereotype associated with driving (*18*), the aim of this study is to develop a questionnaire designed to measure the perception of men and women drivers (PMWD) among young French adults. This could permit to study the effect of stereotyped image of men and women drivers on driving behaviors and provide a better understanding of risky driving behaviors.

2. METHOD

2.1 Draft questionnaire

The aim of the present study was to construct a questionnaire measuring PMWD among young French adults. To measure PMWD among young French adults, four main dimensions of driving behaviors were differentiated, as obtained by Degraeve *et al.* (18) for men and women drivers through free association questionnaire: driving skills, compliance to traffic rules, courtesy behind the wheel, and risk avoidance in driving.

Eight items were developed for each dimension. These items were made from contents that participants gave to describe men and women behind the wheel in the study from Degraeve *et al.* (*18*). These items were the same for men and women. The questionnaire was divided into two sections (men / women behind the wheel). In each section, items were alternated between each dimension (driving skills, compliance with traffic rules, risk avoidance, courtesy). The order of items was the same for both sections. For each item, participants had to indicate their degree of agreement with the statement on a seven points scale (1 = not agree at all to 7 = strongly agree).

2.2 Pretests

The purpose of the pretests was to determine whether the items that make up the experimental version of the questionnaire are clear, unambiguous and expressed in a language that is understood by the target population. Several pretests were made to improve comprehension of items among targeted population. In a first stage 14 participants were asked to first filled a paper and pencil questionnaire and then were interviewed by the experimenter. During this interview, participants had to explain their impressions on the questionnaire, to explain what they have not understood and what they think should be changed to improve the comprehension of items in each dimension.

In a second stage participants were asked to complete the questionnaire online. A principal component analysis (PCA) was then made to test the structure of the questionnaire. A new version of the questionnaire was finally made on the basis of the PCA results and proposed online to new participants. Thus several principal component analyses (PCA) were made to test the structure of the questionnaire. Between each PCA, changes were made on the questionnaires on the basis of these results in order to improve the structure and the differentiation between the four dimensions measured. Totally, this second stage was completed by 109 participants.

2.3 GSAD Questionnaire

2.3.1 Questionnaire

Four dimensions were measured in the experimental version of the questionnaire, for each driver's gender. Dimensions concerning skills, compliance to traffic rules, and risk avoidance were each made up by seven items; courtesy dimension included six items. The questionnaire

was proposed online in a counterbalanced order (i.e., half of the participants began with the men behind the wheel section and half of the participants began with the women behind the wheel section). In each section, items were alternated between each dimension. The order of items was the same for both sections. For each of the 27 items for each driver's gender, the response was classified on a discrete ordinal scale. Participants had to indicate their degree of agreement with the statement on a seven points scale (1 = not agree at all to 7 = strongly agree).

2.3.2 Participants

The questionnaire was completed online by 108 participants (33 Men and 75 women), from 18 to 29 years old. Their mean age was 23.57 years old (SD = 7.78). Eighty six percent of them (93) had their driving license. Preliminary analyses treating the putative role of participant possession of driving license found no main effects. As such, the role of possession of driving license was not considered further.

3. RESULTS

3.1 Analysis of the questionnaire structure

To analyze the structure of the questionnaire, PCA with an oblimin rotation were performed on the 27 items of each section of the PMWD questionnaire for the whole sample. A first PCA was then perform with all the responses of the 108 participants on the 27 items of the perception of women driver section and a second PCA was perform with all the responses of the 108 participants on the 27 items of the perception of men driver section. Each item with eigenvalues < 1 was excluded as well as items with loading values < .30 or those which filled equally on several axes. Several *t* tests were then performed on final axis to test gender differences on each dimension of each section.

3.1.1 Perception of *women drivers*

For women drivers, the scree plot indicated that the data best fitted with a four-factor solution which explained 77.52 % of the total variance (See Table 1).

[Insert TABLE 1 here]

Both items of compliance with alcohol restriction in driving were removed because they equally loaded on axis one and axis four. A new PCA was performed without these two items and created the final factor structure. The scree plot indicated that the data best fitted by a four-factor solution which explained 79.31 % of the total variance (Cronbach's α =.96).

The first factor (F1) concerning risk avoidance of women drivers was composed by seven items and explained 52.95% of the total variance (Cronbach's α = .96). The second factor (F2) concerning women driver skills was composed by seven items and explained 15.42% of the total variance (Cronbach's α = .95). The third factor (F3) concerning women driver courtesy was composed by six items and explained 6.85% of the total variance (Cronbach's α = .96). The fourth factor concerning women driver compliance with traffic rules was composed by five items and explained 4.09% of the total variance (Cronbach's α = .88). Table 1 shows the items that were included in each factor of the questionnaire of adherence to PMWD concerning women.

3.1.2 Perception of *men drivers*

For men drivers, the scree plot indicated that the data best fitted with a four-factor solution which explained 77.72 % of the total variance (Cronbach's α=.96) (See Table 2). No items had to be removed (i.e., no item has loading value < .30 on one axis or loaded equally on several axes).

[Insert TABLE 2 here]

The first factor (F1) concerning risk avoidance and compliance with speed limitations of men drivers was composed by eleven items and explained 50.60% of the total variance (Cronbach's α = .96). The second factor (F2) concerning men driver skills was composed by seven items and explained 16.58% of the total variance (Cronbach's α = .96). The third factor (F3) concerning men driver courtesy was composed by six items and explained 6.19% of the total variance (Cronbach's α = .95). The fourth factor concerning men driver compliance with alcohol restrictions was composed by three items and explained 4.36% of the total variance (Cronbach's α = .77). Table 2 shows the items that were included in each factor of the questionnaire of adherence to PMWD concerning men.

3.2 Correlations

Four scores were calculated on PMWD questionnaire concerning women drivers and four scores concerning men drivers. Correlations between scores of each items and the axis they belong were calculated. Analysis of the relationship between scores of PMWD for men and women drivers was made through Bravais Pearson "*r*"(See Table 3).

3.2.1 Perception of *women drivers*

For women drivers the results showed that the items were highly correlated to their own factor (r > .80) and were stronger correlated to their own factor than to the others three factors.

[Insert TABLE 3 here]

The score of risk avoidance was significantly correlated with the score of courtesy and the score of compliance with traffic rules: the more the participants perceived women drivers as avoiding risk and complying with alcohol restrictions, and the more they perceived that they are courteous drivers and compliant with traffic rules (mainly speed limitations). The score of courtesy was significantly correlated with the score of compliance with traffic rules and the score of driving skills: the more participants perceived women as courteous drivers, and the more they perceived they are compliant with traffic rules (mainly speed limitations) and skillful drivers.

3.2.2 Perception of *men drivers*

For men drivers the results showed that items were highly correlated to their own factor (r > .80) and were stronger correlated to their own factor than to the others three factors (See Table 4).

[Insert TABLE 4 here]

The score of risk avoidance was strongly correlated with the score of courtesy and the score of compliance with alcohol restriction (r > .60): the more participants perceived men drivers as avoiding risk and complying with speed limitations, and the more they perceived that they are

courteous drivers and compliant with alcohol restrictions. The score of courtesy was almost strongly correlated with the score of compliance with alcohol restriction (r = .60): the more participants perceived men drivers as compliant with alcohol restrictions, and the more they perceived them as courteous drivers.
For both men and women questionnaire, the correlation between driving skills and compliance to traffic rules is lower than the five others correlations.

3.3 Skills and courtesy scores differences

The perception of women and men drivers was compared through paired sample t test on the driving skills and courtesy only, as the other scores were not composed by the same items for men and women drivers..

3.3.1 Skills scores differences
Concerning driving skills, results revealed that participants judge men drivers significantly more skillful (M=35, SD=6.83) than women drivers (M=29.41, SD=7.50, t(107) = -6.11, p < .001). They also show that men participants judge men drivers significantly more skillful (M=34.82, SD=6.94) than women drivers (M=26.88, SD=7.85, t(32) = -3.90, p < .001) and that women participants judge men drivers significantly more skillful (M=35.08, SD=6.83) than women drivers (M=30.55, SD=7.10, t(74) = -4.78, p < .001).

3.3.2 Courtesy scores differences
Concerning courtesy behind the wheel, results revealed that participants judge women drivers significantly more courteous behind the wheel (M=26.56, SD=6.51) than men drivers (M=21.70, SD=6.06, t(107) = 5.94, p < .001). They revealed that women participants judge women drivers significantly more courteous behind the wheel (M=27.15, SD=6.56) than men drivers (M=20.61, SD=5.60, t(74) = 7.28, p < .001). For men participants there is no difference between the courtesy of women and men behind the wheel.

3.4 Gender differences
Independent sample t tests were performed to analyze the differences between men and women participants on their scores on the different dimensions of the PMWD (See Table 5).

[Insert TABLE 5 here]

The t tests conducted on the dimensions of the perception on women drivers revealed no statistically significant differences between the scores of men and women participants on PMWD concerning risk avoidance, courtesy, and compliance with traffic rules. T test on score of perception of women driving skills revealed that women participants (M=30.55, SD=7.10) more than men participants (M=26.88, SD=7.85) perceived women as skillful drivers t(106) = -2.39, p < .05).

Independent sample t tests on the dimensions of the perception of men drivers revealed no statistically significant differences between the scores of men and women participants concerning perception of men driving skills. T test on risk avoidance revealed that men participants (M=40.21, SD=32.56) more than women participants (M=32.56, SD=10.41) perceived men drivers as avoiding risk taking and complying with speed limitations (t(106) =

3.45, $p = .001$). T test on courtesy revealed that men participants (M=24.15, SD=6.44) more than women participants (M=20.61, SD=5.60) perceived men drivers are courteous behind the wheel ($t(106) = 2.88$, $p < .01$). T test on compliance with traffic rules revealed that men participants (M=10.64, SD=3.67) more than women participants (M=9.28, SD=3.06) perceived men drivers are compliant with alcohol restrictions ($t(106) = 2$, $p < .05$).

4. DISCUSSION

Many studies are interested in the effect of gender and sex on driving risk taking but rarely studied the perception of men and women as drivers. Measuring these perceptions is necessary before observing its effects on driving behaviors. The aim of this study was then to create a questionnaire designed to measure perception of men and women as drivers among young French adults. Furthermore, gender differences between the scores of men and women participants on perception of women and men drivers were measured.

The variance explained by the axes determined by the PCAs and homogeneity indices are satisfactory, showing a good content validity and a good internal reliability. Results indicate that the organization of the perception of men driver differs from the organization of the perception of women driver. Indeed, in their perception of women driver, participants differentiate between the skills of women drivers, their compliance to traffic rules (speed limitations mainly), their courtesy behind the wheel, and their avoidance to driving risk taking. Alcohol restrictions do not seem to clearly contribute to define the perception of women drivers however. From another side perception of men driver seems to differentiate driving skills, courtesy, alcohol restriction compliance, whereas speed limitations compliance and risk avoidance load both on a fourth dimension. It seems that for participants men driver risk taking is manifested mainly by violations of speed limits. These results are in line with the fact that men drivers are mainly defined by their risk taking and their fast driving (*17, 18*). Nevertheless these results should be confirmed in a larger sample.

Concerning driving skills dimension, results show that even if they perceived their driving skills as higher than male participants did, women perceived men drivers as more skillful than women drivers. As participants of both genders have a higher score on this dimension for men drivers than for women drivers, the stereotype of skillful men drivers seems consensual. These results are in keeping with that "being a skillful driver" is seen as a masculine trait (*7*).

However, results also reveal gender differences concerning PMWD. Indeed, men, more than women, perceived men drivers as avoiding risk, complying to speed and alcohol restrictions, and courteous behind the wheel, while women, more than men, perceived women as skillful drivers. Except for the dimension concerning driving skills, men participants do not attribute more negative characteristics to women drivers than women participants. However, men denigrate drivers from the out-group (i.e. women drivers) by weakly adhering to the most differentiating dimension: driving skills. Women denigrate drivers from the out-group, by attributing negative characteristics more strongly to men driver. These results are in keeping with research on gender stereotypes and, more generally on intergroup relations, which have shown how individuals seek positive distinctiveness, by denigrating the out-group while promoting the in-group (*19, 20, 21*).

Power-based gender stereotype approaches (*22*) and the effects of social asymmetry between genders (*23*) can provide an additional understanding of these results. Thus, research has shown that the dominant position of the men group (*24, 25, 26*) leads members of the socially dominated women group to over-promote the in-group (*27, 28, 29*). It appears that associating

the driving activity with the men role in society causes women to ‘‘defend’’ their gender identity more than men need to.

5. CONCLUSION

The aim of this study was to create a questionnaire designed to measure perception of men and women drivers among young French adults. These results showed that despite the higher proportion of men involved in road accidents, both men and women think that men drivers are more skillful than women drivers. This could be used during the driving training to make learner drivers aware of the discrepancy between their own perceptions of men’s and women’s driving and safety skills and the reality of women’s and men’s road crash risk. The results kept with previous work on driving stereotypes and on in-group and out-group relations. This tool can be used as a basis for further research on the relation of perception of men and women drivers, the adherence to gender stereotypes, and risk taking behaviors on the road. Future studies should extend their research to all ages of the driving population to permit a better understanding of sex differences in risk taking and accident in driving.

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Table titles

TABLE 1 Principal component analysis on perception of women drivers

	Items	F1	F2	F3	F4
7	I think that women refrain from having dangerous behaviors behind the wheel	.897			
23	I think that women avoid dangerous behaviors behind the wheel	.888			
15	I think that women avoid to adopt a risky driving	.869			
3	I think that women avoid taking risk while driving	.838			
19	I think that women refrain from having risky behaviors behind the wheel	.758			
11	I think that women avoid risky behaviors behind the wheel	.752			
27	I think that women avoid engaging in risky situations behind the wheel	.688			
22	I think that women don't exceed the permitted alcohol limit for driving	.490			.420
6	I think that women respect the permitted alcohol limit for driving	.372			.324
17	I think that women are dexterous behind the wheel		.894		
25	I think that women know how to maneuver their vehicle		.883		
5	I think that women are skillful behind the wheel		.880		
13	I think that women have good driving abilities		.837		
21	I think that women have a good driving dexterity		.823		
9	I think that women have good driving skills		.811		
1	I think that women have a good mastery of their vehicle		.789		
8	I think that women are respectful of others road users			-.870	
20	I think that women show politeness behind the wheel			-.851	
16	I think that women show manners to others road users			-.814	
12	I think that women are civic behind the wheel			-.794	
24	I think that women show consideration to others road users			-.761	
4	I think that women are courteous drivers			-.760	
18	I think that women don't exceed speed limitations				.797
10	I think that women don't break speed limitations				.665
26	I think that women respect speed limitations				.657
14	I think that women never run red lights				.646
2	I think that women comply to speed limitations			-.313	.606

TABLE 2 Principal component analysis on perception of men drivers

	Items	F1	F2	F3	F4
11	I think that men avoid risky behaviors behind the wheel	.968			
23	I think that men avoid dangerous behaviors behind the wheel	.913			
27	I think that men avoid engaging in risky situations behind the wheel	.889			
3	I think that men avoid taking risk while driving	.879			
7	I think that men refrain from having dangerous behaviors behind the wheel	.860			
15	I think that men avoid to adopt a risky driving	.856			
19	I think that men refrain from having risky behaviors behind the wheel	.841			
2	I think that men comply to speed limitations	.625			
26	I think that men respect speed limitations	.600			
18	I think that men don’t exceed speed limitations	.592			
10	I think that men don’t break speed limitations	.494			.308
17	I think that men are dexterous behind the wheel		.937		
25	I think that men know how to maneuver their vehicle		.923		
5	I think that men are skillful behind the wheel		.886		
13	I think that men have good driving abilities		.877		
9	I think that men have good driving skills		.873		
21	I think that men have a good driving dexterity		.839		
1	I think that men have a good mastery of their vehicle		.794		
12	I think that men are civic behind the wheel			.913	
20	I think that men show politeness behind the wheel			.878	
8	I think that men are respectful of others road users			.874	
16	I think that men show manners to others road users			.863	
4	I think that men are courteous drivers			.825	
24	I think that men show consideration to others road users			.810	
14	I think that men never run red lights				.866
6	I think that men respect the permitted alcohol limit for driving				.631
22	I think that men don’t exceed the permitted alcohol limit for driving	.359			.599

TABLE 3 Bravais Pearson correlations between scores of perception of women drivers

	F2 : Driving skills	F3 : Courtesy	F4 : compliance with traffic rules
F1 : Risk avoidance	.438***	.665***	.748***
F2 : Driving skills		.557***	.27**
F3 : Courtesy			.644***

TABLE 4 Bravais Pearson correlations between scores of perception of men drivers

	F2 : Driving skills	F3 : Courtesy	F4 : Compliance with alcohol restriction
F1 : Risk avoidance and speed restriction	.322***	.724***	.624***
F2 : Driving skills		.439***	.256**
F3 : Courtesy			.596***

TABLE 5 Mean and SD on PMWD

		Perception of women drivers				Perception of men drivers			
		F1	F2	F3	F4	F1	F2	F3	F4
Entire sample	Mean	34.19	29.43	26.56	22.79	34.90	35	21.70	9.69
	SD	7.92	7.50	6.51	5.86	11.15	6.83	6.06	3.30
Women participants	Mean	34.71	30.55	27.15	23.01	32.56	35.08	20.61	9.28
	SD	7.63	7.10	6.56	5.71	10.41	6.83	5.60	3.06
Men participants	Mean	33	26.88	25.24	22.27	40.21	34.82	24.15	10.64
	SD	8.55	7.85	6.28	6.23	11.10	6.93	6.44	3.67