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1 **GENDER IDENTITY AND RISKY BEHAVIORS AMONG YOUNG DRIVERS**

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19
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1 ABSTRACT

2 Globally, men, and particularly young men, are involved in more road traffic crashes than
3 women, which may be due to a greater tendency to engage in risky behaviors. Understanding
4 and explaining this "gender specificity" in risky behaviors, specifically among young drivers,
5 has become a major public-health issue. The present study extends research on the effect of
6 gender identity on risky driving behaviors by investigating the effect of sex, sex-stereotype
7 conformity and gender group identification on self-reported driving behaviors among young
8 drivers. 75 young drivers (28 males, 47 females) filled in a form including a series of scales
9 assessing gender group identification by measuring three components of gender identity
10 (typicality, contentedness and centrality), a French version of the Bem Sex-Role Inventory, an
11 extended version of the Driver Behaviour Questionnaire (assessing violations, dangerous and
12 inattention errors and positive behaviors) and questions about mobility and accident history.
13 The effects were tested on outcome variables by using hierarchical regression analysis. It was
14 found that sex (being female) only predicted the inexperience errors, while the femininity
15 score negatively predicted the number of accidents. No effects of maleness and masculinity
16 were observed in other driver behaviors, contrary to what was expected. Gender identity
17 variables only had an effect among males, with typicality positively predicting dangerous
18 errors and contentedness negatively predicting positive behaviors. Lastly, results showed that
19 gender identification appears to be associated with low conformity to feminine stereotypes
20 among males. Hypotheses were not confirmed but results underlined the importance of taking
21 gender identity variables into account when explaining risk-taking differences between and
22 within gender groups. Implications of these results are discussed.

23

1. INTRODUCTION

Gender differences are well known in accidentology and manifest themselves very early on in different types of accidents, and in particular in traffic injury rates. Men are involved in more road traffic crashes than women. In most Western countries, male drivers are 2 to 3 times more likely to die in road traffic crashes than female drivers (1, 2). In France, men were nearly four times more likely to die and twice as likely to be injured for the same number of miles travelled, in 2007 (3). Male drivers also commit more traffic offenses than females (4), which is associated with active and passive accidents (5, 6). This sexospecificity in accidents and offenses is particularly noticeable among young drivers. Studies underline several variables behind the high accident rates among young drivers, like life style, driving inexperience, lack of skills, risk perception, drinking and driving and risk taking (7–11). Risk-taking would also explain gender differences in accidents rates. Generally, males tend to engage significantly more than women in high-risk activities (12). More particularly, young male drivers are more prone to taking risks (13), engaging in aggressive driving behaviors, driving fast, and committing more violations than other age groups (14, 15), which contributes to increase the frequency and extent of trauma in this population.

Men's tendency to take more risks has been generally explained in the past by biological theories and notably by the effect of testosterone, a male steroid hormone, that has been associated with sensation seeking (16), aggression (17) and venturesomeness (18). However, according to recent researches, these relationships could be influenced by socialization (19).

Recent studies have explored social environment influences on adults' gender differences in risk-taking behavior and transgression, taking into account the effects of gender roles, that is social expectations in terms of behaviors, personality traits and activity, depending upon the individual gender group (20). The majority of people's beliefs regarding male and female behavior can be summarized in terms of differences on two dimensions, the communal and the agentic (21). Women are expected to be friendly, unselfish, concerned with others, emotionally expressive, sensitive and caring, whereas men are expected to be assertive, directive, instrumentally competent, autonomous, adventurous and independent (22–27). Gender roles are based on gender stereotypes, which can be defined as the set of beliefs regarding what it means to be a male or a female in a given society (23). In particular, risk-taking is characterized as a typically masculine type of behavior (28), which is consistent with risk-taking gender norms: while females are expected to be passive and non-competitive, and to not take risks, males are encouraged to be more aggressive and to take risks (29). Thus, gender roles, through differential socialization, could lead to gender differences concerning compliance with traffic regulations (29) and risk taking (30, 31). Nevertheless, an individual can conform to stereotypes associated with both sex groups (28), thus gender roles could explain differences in risk-taking between and within sex groups.

Most of the studies showed the deleterious effect of masculinity on risky driving behaviors. For example, men who have been primed with the concept of masculinity exhibit more risky driving behaviors, particularly in terms of speed (32). Men who exhibit a macho personality have been showed to report more aggressive driving behavior than other men (33). Conformity to masculine stereotypes has been showed to predict self-reported injury risk behavior and driving style, with masculine people reporting more violations and offenses than feminine people (34), overestimating their driving skills (35) and perceiving themselves as having better perceptual-motor skills (36), which is associated with a risky driving style and road accidents.

1 On the other hand, femininity seems to have beneficial effect on risky behaviors. In
2 driving, femininity has been showed to negatively predict the number of accidents and
3 offenses, aggressive and ordinary violations, and errors (34). Plus, high levels of femininity
4 buffer the effects of masculinity on accidents and aggressive violations (34). Özkan and
5 Lajunen (36) highlighted the link between femininity and skills in terms of safety that are
6 negatively related to the number of accidents. Thus, although masculinity seems to reinforce
7 risky driving behaviors, femininity seems to be negatively associated with risky driving
8 behaviors.

9 Research showed that sex-stereotype conformity would be a better predictor of
10 declared injury-risk behaviors than biological sex (31, 37). For example, in a study about
11 risky driving behaviors, Özkan and Lajunen (34) showed that being male positively predicted
12 only self-reported ordinary violations, while masculinity positively predicted the number of
13 offenses, and aggressive and ordinary violations. Sibley and Harré (35) showed that gender
14 role identification fully mediated the effect of gender on driving self-enhancement that is
15 linked to risk-taking. Other researches assume that there may be a double risk factor for men
16 due to both biological and social gender (38).

17 Studies investigating the link between gender roles and risky behaviors generally used
18 the Bem Sex Role Inventory (28). In BSRI, masculinity and femininity are independent
19 dimensions constituted with male-typed and female-typed traits, according to their social
20 desirability in society. That is to say, masculinity consists of traits evaluated to be more
21 suitable for males than females, whereas femininity consists of traits evaluated more
22 acceptable for females than males in the society. Masculinity is “an instrumental orientation,
23 a cognitive focus on ‘getting the job done’; and femininity has been associated with an
24 expressive orientation, an affective concern for the welfare of others” (28, p.156). Studies
25 using the inventory have found masculine sex role orientation - that is to say, conformity to
26 agentic traits such as competition, assertiveness or self-confidence - to be associated with
27 sensation seeking (39) aggression (40) and self-enhancement (35), which have been linked to
28 risky driving (41, 42). On the other hand, conformity to communal traits appears to be linked
29 to lower hostility (43).

30 Most studies that have examined the relationship between gender roles and risky
31 driving behaviors focus on the effect of masculinity and femininity on risky behaviors,
32 considering gender identity in terms of gender stereotype conformity only. However, gender
33 identity is now viewed as a multidimensional construct (44), including not only the traditional
34 dimensions of gender identity, that is to say, sex-stereotype conformity, but also other
35 dimensions, such as the perception the individual has of his/her own gender identity. Egan
36 and Perry (45) developed a multidimensional series of scales to assess the gender identity of
37 9-10 years-old and 13-14 years-old. These scales include traditional measures of gender
38 identity (two scales assessing male and female-typed traits and two scales assessing male and
39 female-typed activities), but also take into account other dimensions of gender identity:
40 typicality (feeling one is a typical member of one’s gender group), contentedness (satisfaction
41 of belonging to the sex-group to which one has been assigned), feeling under pressure (felt
42 pressure from peers, parents and oneself to conform to gender roles associated with one’s
43 gender); and intergroup bias (feeling that one’s gender group is superior to the other group).
44 Researchers studied other dimensions of gender identity, such as centrality, that is the
45 importance of gender identity in their self-concept (46, 47).

46 The present study extended research on the effect of gender identity on self-reported
47 risky driving behaviors among young drivers. More particularly, the aim was to replicate
48 studies showing the effect of sex and sex-stereotype conformity on driving behaviors,
49 including positive behaviors, which has not been studied yet (34), and to investigate the

1 effects of gender group identification by assessing different dimensions of gender identity
2 (typicality, contentedness and centrality), which has not been studied in the area of driving to
3 the best of our knowledge. Plus, it is assumed that depending on the feeling of being a typical
4 member of one's gender group, the contentedness with one's biological gender group and the
5 importance of gender in the self-concept, individuals will try to conform either more or less to
6 stereotypes associated with their group and, thus to behaviors associated with their group such
7 as risky behaviors in driving.

8 In particular, the following hypotheses were examined:

9 Hypothesis 1: Male drivers report more risky driving behaviors than females.

10 Hypothesis 2: Drivers who highly conform to masculine stereotypes report more risky driving
11 behaviors, whereas drivers who highly conform to feminine stereotypes report fewer risky
12 driving behaviors.

13 Hypothesis 3: Gender group identification, through centrality, typicality and satisfaction
14 levels explains risky driving behaviors, a strong identification among male group leading to
15 more risky behaviors.

16 **2. METHOD**

17 **2.1. Material**

18 *2.1.1. Gender Identity*

19 **2.1.1.1. Sex-Stereotype Conformity.** Sex-stereotype conformity was measured by using a
20 French version of Bem Sex-Role Inventory which contains three scales (masculine, feminine
21 and neutral) (28, 48). The masculine scale (9 items) includes characteristics that are perceived
22 as male characteristics in society; that is, agentic traits (e.g., authoritarian, strong personality,
23 dominating, etc.). The feminine scale (9 items) includes characteristics that are perceived as
24 female characteristics in society; that is, communal traits (e.g., understanding, affectionate,
25 sympathetic, etc.). The rest of the characteristics (9 items) consisted of neutral items that are
26 perceived as neither male nor female characteristics (e.g., conscientious, frank, serious, etc.).
27 Participants were asked to indicate the degree to which each of the 27 personality
28 characteristics described their own personalities on a 7-point scale (from 1=almost never true
29 to 7=almost always true).
30
31
32
33
34

35 **2.1.1.2. Gender Identity Variables.** Gender typicality, that is, feeling one is a typical
36 member of one's sex, and gender contentedness, that is, feeling content with one's biological
37 sex, were measured by using scales adapted from the French series of scales validated by
38 Jodoin & Julien (49) among eight to 16-year-olds. The series of scales was originally
39 validated by Egan and Perry (45) with an American sample. Items were adapted to adult
40 people and were either for men or for women. Gender typicality scale includes four items
41 (e.g. "I feel annoyed that I'm not supposed to do certain things just because I am a man/ a
42 woman"). Gender contentedness scale includes six items (e.g. "I think I'm like all the other
43 men/women of my age"). Gender centrality, that is the importance of gender as part of the
44 self-concept, was measured by using the centrality subscale from Luhtanen and Crocker's
45 collective self-esteem scale (47). The scale includes four statements that were modified to
46 assess the centrality of being a man or a woman to their self-concept (e.g., "My sex group is
47 an important part of what I am"). For each scale, participants were asked to indicate the
48 degree to which they agree with each item on a 7-point scale (from 1=strongly disagree to 7=

1 strongly agree). The scale had been previously pre-tested and validated on an adult
2 population.

3 4 *2.1.2. Driving Behavior*

5
6 Driving behaviors were measured by using an extended version of the Driver Behavior
7 Questionnaire (4) validated among a large population of French drivers (50). The new
8 extended version of DBQ differentiates between six types of behaviors. The tool includes two
9 types of violations: aggressive violations (3 items), which refer to behaviors of aggressive
10 interpersonal violence, and ordinary violations, which refer to deliberate deviations in driving
11 but without any aggressive purpose (6 items). Dangerous errors (6 items) contain
12 unintentional behaviors that deviate from the planned action and are potentially dangerous.
13 The tool includes two types of lapses: inattention errors (7 items) that refer to unintentional
14 and slightly dangerous behaviors that appeared to be due to a lack of attention, and
15 inexperience errors (4 items) that refer to unintentional and slightly dangerous behavior that
16 appeared to be caused by the individual's lack of driving experience. Lastly, the tool includes
17 positive behaviors (9 items), that is, pro-social behaviors intended to facilitate interactions
18 with other users. Participants were asked to indicate on a 7-point scale how often they
19 committed each of the 35 behaviors in the previous year (0= never to 7= very often). Even if
20 lapses and positive behaviors are not critical for safety and not related to accidents, the whole
21 tool was used in order to explore the link between gender identity and different types of
22 driving behaviors.

23 24 *2.1.3. Demographic Variables*

25
26 Participants were asked to indicate their age, sex, frequency of driving and kilometers driven
27 per week, the number of years as a fully licensed driver, and number of accidents and offenses
28 since holding a license.

29 **2.2. Population and Procedure**

30
31 The data reported in this study was collected from 75 undergraduate students (28 males and
32 47 females) between 18 and 25 years of age (mean = 20.75 years, SD = 1.9). All individuals
33 had a license B with a range of 0-8 years of driving experience (mean 2.2, SD = 1.6) and half
34 the sample had less than 2 years of driving experience. 53.33% of the sample learned driving
35 with AAC (early driver training). Concerning driving frequency, 20% of the sample declared
36 that they drive every day, 28% stated that they drive four or five times a week, 45.33% stated
37 that they drive one to three times a week, and just 6.67% of the participants said that they
38 never drive. 34.33% of the sample drove a car less than 50 km a week and 32% drove 50 to
39 150 km. 30.66% of the sample drove more than 150km a week. Finally, as showed in table 1,
40 the number of accidents since obtaining the category B driver's license ranged from 0
41 (69.33%) to 3 (4%), with 20% of the sample having had one accident and 6.67% having had
42 two accidents since obtaining the category B driver's license. The number of offenses since
43 obtaining the category B license ranged from 0 (78.67%) to more than 3 (2.67%) with 12% of
44 the sample had one offence and 6.67% had two offenses since obtaining the category B
45 driver's license. Characteristics for the whole sample as well as for male and female drivers
46 separately are presented in Table I.

47 They were recruited at the University Library for an online survey. The link to the
48 questionnaire was sent to all students by mail. They were guaranteed anonymity and
49 confidentiality. The participants filled out a French version of the DBQ, after which they

1 filled out a tool measuring different aspects of gender identity, and items related to
2 demographic variables. The questionnaire took about 20 minutes.

3 4 2.3. Data Treatment

5
6 The data were analyzed by using reliability analyses, Pearson correlations, linear
7 regression analyses and hierarchical regression analyses.

8
9 **TABLE 1 Sample characteristics**

		Total	Males	Females
N		75	28	47
Age	Mean	20.75	21.43	20.34
	SD	1.9	2.12	1.66
Years holding a license	Mean	2.2	2.67	1.94
	SD	1.6	1.77	1.45
Number of accidents	Mean	.45	.36	.51
	SD	.79	.56	.91
Number of offenses	Mean	.39	.43	.36
	SD	1.01	.74	1.15

11 12 13 **3. RESULTS**

14 15 **3.1. Reliabilities of scales**

16 17 *3.1.1. Sex-stereotype Conformity and Gender Identity variables*

18
19 Reliability analyses of the French version of the BSRI answers indicated that Cronbach's
20 alphas for the masculinity and femininity scales were 0.74 and 0.84, respectively. Reliability
21 analyses have also been carried out for each cognitive dimension of gender identity.
22 Cronbach's alphas for typicality, contentedness and centrality were .69, .83 and .72,
23 respectively. Thus, the reliability of the masculine and feminine stereotypes and of the gender
24 identity variables can be considered satisfactory.

25 26 *3.1.2. DBQ*

27
28 Cronbach's alphas have been calculated for each DBQ scale: "positive behaviors" ($\alpha = .50$),
29 "dangerous errors" ($\alpha = .54$), "inexperience errors" ($\alpha = .64$), "inattention errors" ($\alpha = .70$),
30 "ordinary violations" ($\alpha = .73$) and "aggressive violations" ($\alpha = .43$). A general score of
31 violations including ordinary and aggressive violation items has been calculated ($\alpha = .75$).
32

33 **3.2. Correlates of DBQ and Gender Identity variables**

34

1 Pearson's r correlations between background variables, the scores of DBQ and gender identity
2 variables and sex-stereotypes conformity were calculated for men and women separately (see
3 Table 2).

4 As regards background variables and the number of accidents and offenses among
5 females, the number of years holding a license correlated positively with the number of
6 kilometers driven per week and the number of accidents and offenses. The number of
7 kilometers driven per week correlated negatively with contentedness. The number of
8 accidents correlated positively with the number of offenses and violations, and negatively
9 with positive behaviors and feminine-stereotypes conformity. Regarding DBQ scores, the
10 inattention errors score was positively correlated with inexperience and the dangerous errors
11 scores. Lastly, as regards gender identity variables, typicality was positively correlated with
12 centrality. Correlations were moderate.

13 As regards background variables and the number of accidents and offenses among
14 males, the number of offenses was positively correlated with violations. Correlation was
15 relatively high. Regarding DBQ scores, inexperience errors, inattention errors and dangerous
16 errors were positively inter-correlated. Correlations were relatively high. Furthermore, the
17 dangerous errors score was positively correlated with typicality. Violations correlated
18 positively with centrality. Positive behaviors were negatively associated with centrality and
19 contentedness. Correlations were moderate to relatively high. Finally, as regards gender
20 identity scales and sex-stereotype conformity, contentedness correlated positively with
21 typicality and centrality, whereas feminine-stereotype conformity was negatively associated
22 with contentedness and centrality. Correlations were moderate.

23 Correlations among the three measures of gender identity and sex stereotype
24 conformity were either modest or insignificant, confirming the utility of a multidimensional
25 approach to gender identity.

1 **TABLE 2 Correlates among DBQ scores, Gender Identity variables and Background variables, by sex**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Sex-stereotype conformity														
1. Masculine traits	-	-.02	.15	-.09	.08	-.01	-.17	.09	-.21	.14	.20	.12	-.08	.05
2. Feminine traits	-.11	-	.04	.12	.10	.07	-.15	-.10	.18	-.16	-.3*	-.27	-.01	-.14
Gender identity														
3. Gender contentedness	-.13	-.52**	-	.03	-.15	.06	-.15	.04	-.21	.26	.02	-.21	-.29*	.06
4. Gender typicality	.06	-.21	.37*	-	.49***	.16	-.03	-.17	-.10	.01	.19	.04	-.11	-.09
5. Centrality	.01	-.44*	.5**	.20	-	.27	.02	-.04	-.13	.04	.26	.04	.02	-.08
DBQ scales														
6. Inexperience errors	.22	-.05	-.24	.25	-.27	-	.34*	.13	.07	.10	.05	-.18	-0.04	-.13
7. Inattention errors	-.11	.14	-.14	.24	-.20	.63***	-	.42**	.09	.20	.14	-.09	0.22	-.07
8. Dangerous errors	.21	.08	-.20	.40*	-.02	.73***	.44*	-	-.07	.28	.09	.05	0.15	.10
9. Positive Behaviors	.14	.20	-.62***	-.28	-.46*	.27	.18	.19	-	-.26	-.36*	-.22	-0.00	-.11
10. Violations	.13	-.29	.30	.08	.44*	-.03	-.01	.16	-.25	-	.31*	.11	-0.14	.25
Background variables														
11. Number of accidents	-.06	-.19	-.08	-.35	.03	.06	.08	-.14	.13	-.00	-	.42**	.04	.39**
12. Number of offenses	-.26	.02	.15	.12	.17	.14	.07	.18	-.07	.50**	-.13	-	.22	.34*
13. Kilometers driven weekly	.14	.11	-.09	.16	-.27	.27	.36	.19	.20	.06	-.16	.07	-	.29*
14. Years holding a license	.15	-.06	-.15	.07	-.03	.31	.14	.29	.19	.25	.09	.29	-.23	-

2 *Note : Correlations for females are above the diagonal; correlations for males are below the diagonal. * $p < .05$; ** $p < .01$; *** $p < .00$*

3.3. Effect of Gender Identification on Sex-stereotype Conformity

Linear regression analyses were carried out to observe the effect of gender identification on sex-stereotype conformity. Two analyses were carried out among males and females separately: the first one tested the effect of gender identification on the masculine-stereotype conformity; the second one tested the effect of gender identification on the feminine-stereotype conformity. A global score of gender identification was calculated by averaging the scores of items constituting the three specific scales: centrality, contentedness and typicality. A low score indicated weak gender identification and a high score indicated strong gender identification.

Results showed no effect of gender identification on masculine stereotype conformity among females and males. No effect of gender identification was observed on feminine stereotype conformity among females, but gender identification negatively predicted feminine-stereotype conformity among males (see Table 3).

TABLE 3 Linear regression analyses of Gender Identification on Sex-stereotype Conformity, by sex

	Females						Males					
	Masculine traits			Feminine traits			Masculine traits			Feminine traits		
	R2	F	béta	R2	F	Béta	R2	F	béta	R2	F	Béta
Gender identification	-.02	.14	.06	-.01	.8	.13	-.04	.00	-.01	.24	9.63*	-.52*

* $p < .05$; ** $p < .01$; *** $p < .001$

3.4. Effect of Sex

3.4.1. Effect of Sex on Sex-stereotype Conformity

T tests were carried out to discern sex differences among masculine and feminine stereotype conformity scores. Results showed no effects on masculine and feminine traits. Means and standard deviations by sex are present in Table 4.

TABLE 4 Means and standard deviations of Sex-stereotype Conformity, by sex

	Males		Females		t
	Mean	SD	Mean	SD	
Sex-stereotype conformity					
Masculine traits	4.01	0.92	3.94	0.82	0.3
Feminine traits	5.14	0.99	5.33	0.86	-0.9

* $p < .05$; ** $p < .01$; *** $p < .001$

3.5. Effect of sex and Gender Identity on DBQ scores, Accidents and Offenses

3.5.1. Effect of Sex and Sex-stereotype Conformity on DBQ scores, Accidents and Offenses

1 In order to examine the effect of sex and sex-stereotype conformity on driving behaviors,
2 accident involvement and traffic offenses, seven separate hierarchical regression analyses
3 were performed on each of the outcome variables (inexperience errors, inattention errors,
4 dangerous errors, violations, positive behaviors, number of accidents, number of offenses). In
5 each of these regressions, years holding a license, kilometers driven weekly and sex were
6 entered in the first step to initially control for their effect, and masculine and feminine
7 stereotype conformity were entered in the second step.

8 As presented in Table 5, the number of years holding a license positively predicted the
9 number of accidents and offenses. Kilometers driven weekly positively predicted the
10 inattention score. Finally, sex significantly predicted the inexperience and inattention errors'
11 score, suggesting that females declared more inexperience and inattention errors than males.
12 The variance explained accounted for by these variables was 8% for inexperience errors, 11%
13 for inattention errors, 6% for dangerous errors, 4% for violations, 3% for positive behaviors,
14 9% for accidents and 12% for offenses.

15 After controlling the effects of kilometers driven weekly, number of years holding a
16 license, and sex, the results of the regression analyses in the second step showed no effect of
17 masculine stereotype conformity on driving behaviors, number of accidents and traffic
18 offenses. Nevertheless, feminine stereotype conformity negatively predicted the number of
19 accidents. The proportion of variance accounted for by masculine-stereotype conformity and
20 feminine-stereotype conformity was 1% for inexperience errors, 3% for inattention errors, 2%
21 for dangerous errors, 6% for violations, 3% for positive behaviors, 7% for accidents and 3%
22 for offenses.

1 **TABLE 5 Hierarchical analyses on DBQ scales, number of Accidents and number of Offenses**

		Inexperience errors			Inattention errors			Dangerous errors			Violations			Positive Behaviors			Number of accidents			Number of offenses		
		R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta
1.	License (years)	.08	2.15	.04	.11	3.02	.08	.06	1.39	.10	.04	0.98	.17	.03	.69	-.01	.09	2.29	.29*	.12	3..23	.31**
	Weekly km			.06			.25*			.16			-.07		.06				-.04			.16
	Sex¹			.28*			.24*			.15			-.13		-.15				.15			.05
2.	Masculine traits	.01	1.33	.06	.03	2.38*	-.17	.02	1.01	.11	.06	1.78	.08	.03	.96	-.07	.07	2.38*	.09	.03	2.29	-.02
	Feminine traits			.03			-.08			-.04			-.17		.18				-.23*			-.15
	Total R2	.09			.15			.07			.12			.07			.15			.14		

2 ¹ males = 1 ; females = 2 * $p < .05$; ** $p < .01$; *** $p < .001$

3

1 *3.5.2. Effect of Sex-stereotype Conformity and Gender Identity variables scales on DBQ*
2 *scores, Accidents and Offenses*

3
4 Observing the effect of gender identity on the whole sample without taking the gender group
5 of the individual into account would not be relevant and would not provide interpretable
6 results given that the effect of gender identity on driving behaviors is expected to be different
7 according to the gender group. Thus, in order to examine the respective effects of sex-
8 stereotype conformity and gender identity variables on driving behaviors and accident
9 involvement and offenses, seven separate hierarchical regression analyses were performed on
10 each of the outcome variables (inexperience errors, inattention errors, dangerous errors,
11 violations, positive behaviors, number of accidents, number of offenses) among males and
12 females separately. In each of these regressions, years holding a license and kilometers driven
13 weekly were entered in the first step to initially control for their effect. Masculine-stereotype
14 and feminine stereotype conformity were entered in the second step and the three variables of
15 gender identity, typicality, contentedness and centrality were entered in the third step.

16
17 **3.5.2.1. Effects among Males.** Regarding males, as presented in Table 6, the number of years
18 holding a license positively predicted the inexperience errors score. Plus, although the model
19 is not significant, results showed that kilometers driven weekly positively predicted
20 inattention errors. The variance accounted for by these variables was 22% for inexperience
21 errors, 18% for inattention errors, 15% for dangerous errors, 8% for violations, 10% for
22 positive behaviors, 3% for accidents and 1% for offenses.

23 When entering sex-stereotype conformity into the model, results of the regression
24 analyses showed no effect of masculine and feminine stereotype conformity on driving
25 behaviors, accidents and traffic offenses. The proportion of variance accounted for by
26 masculine-stereotype conformity and feminine-stereotype conformity was 1% for
27 inexperience errors, 9% for inattention errors, 2% for dangerous errors, 8% for violations, 5%
28 for positive behaviors, 4% for accidents and 21% for offenses.

29 Finally, when entering gender identity variables, although models were not significant,
30 results showed that typicality positively predicted the score of dangerous errors and that
31 contentedness negatively predicted positive behaviors. The variance accounted for by these
32 variables was 15% for inexperience errors, 6% for inattention errors, 19% for dangerous
33 errors, 18% for violations, 33% for positive behaviors, 16% for accidents and 9% for
34 offenses.

35
36 **3.5.2.1. Effects among Females.** Regarding females, as presented in Table 7, the number of
37 years holding a license negatively predicted the number of accidents and offenses, and
38 although the model was not significant, negatively predicted violations. The variance
39 accounted for by these variables was 2% for inexperience errors, 7% for inattention errors,
40 3% for dangerous errors, 11% for violations, 1% for positive behaviors, 16% for accidents
41 and 13% for offenses.

42 When entering sex-stereotype conformity into the model, results of the regression
43 analyses showed no effect of masculine stereotype conformity on driving behaviors, accidents
44 and offenses. Feminine-stereotype conformity negatively predicted the number of accidents.
45 The proportion of variance accounted for by masculine-stereotype conformity and feminine-
46 stereotype conformity was 0% for inexperience errors, 4% for inattention errors, 2% for
47 dangerous errors, 3% for violations, 7% for positive behaviors, 9% for accidents and 7% for
48 offenses.

1 Finally, when entering gender identity variables, results showed no effect of typicality,
2 contentedness and centrality on the variables tested. The variance accounted for by these
3 variables was 8% for inexperience errors, 0% for inattention errors, 2% for dangerous errors,
4 4% for violations, 6% for positive behaviors, 11% for accidents and 5% for offenses.

5

6

1 **TABLE 6 Hierarchical analyses on DBQ scales, number of Accidents and number of Offenses for Males**

		Inexperience errors			Inattention errors			Dangerous errors			Violations			Positive Behaviors			Number of accidents			Number of offenses		
		R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta
1.	License (years)	.22	3.44*	.4*	.18	2.67	.23	.15	2.15	.19	.08	1.0	.28	.10	1.28	.25	.03	.36	.06	.1	1.36	.32
	Weekly km			.36			.41*			.19			.13			.25			-.15			.14
2.	Masculine traits	.01	1.68	.09	.09	2.08	-.29	.02	1.09	.08	.08	1.06	-.05	.05	.97	.14	.04	.38	-.08	.21	1.52	-.35
	Feminine traits			-.05			.09			.10			-.3			.20			-.19			-.01
	Typicality	.15	1.71	.29	.06	1.36	.24	.19	1.51	.48*	.18	1.39	-.19	.33	2.49	-.11	.16	.8	-.37	.09	1.2	-.01
3.	Contentedness			-.28			-.14			-.34			.25			-.54*			-.13			.17
	Centrality			-.27			-.13			.07			.37			-.2			-.0			.26
Total R2		.39			.33			.36			.34			.48			.23			.31		

2 * $p < .05$; ** $p < .01$; *** $p < .001$

3

1 **TABLE 7 Hierarchical analyses on DBQ scales, number of Accidents and number of Offenses for females**

		Inexperience errors			Inattention errors			Dangerous errors			Violations			Positive Behaviors			Number of accidents			Number of offenses		
		R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta	R2	F	béta
1.	License (years)	.02	.35	.12	.07	1.65	.15	.03	.61	-.06	.11	2.74	-.32*	.01	.29	.12	.16	4.12*	-	.13	3.36*	-.3*
	Weekly Km			-.01			.27			.14			-.23			.03			-.08			.14
2.	Masculine traits	.00	.2	-.01	.04	1.42	-.15	.02	.50	.10	.03	1.64	.11	.07	.93	-.2	.09	3.48*	.17	.07	2.59	.12
	Feminine traits			.06			-.17			-.09			-.11			.17			-.25*			-.23
	Typicality	.08	.6	.01	.00	.78	-.03	.02	.42	-.16	.04	1.22	-.02	.06	1.00	-.09	.11	3.13*	.15	.05	1.88	.13
3.	Contentedness			.11			-.04			.09			.21			-.22			-.00			-.22
	Centrality			.27			.04			.05			.11			-.13			.24			-.02
Total R2		.10			.12			.07			.18			.15			.36			.25		

2 * $p < .05$; ** $p < .01$; *** $p < .001$

4. DISCUSSION

The aim of the study was to replicate findings showing the effect of sex and sex-stereotype conformity on driving behaviors (34) and to examine the effect of gender group identification by investigating the effect of three components of gender identity (typicality, contentedness and centrality). It was assumed that depending on the feeling of being a typical member of one's gender group, satisfaction with one's biological gender group and the importance of gender in the self-concept, individuals would more or less try to conform to stereotypes associated with their group and, thus to behaviors associated with their group such as driving behaviors.

The results did not confirm the first hypothesis which expected an effect of gender on driving behaviors. Males did not report more violations, accidents and offenses than women which is not consistent with literature (14, 34, 36, 51, 52). Nevertheless, being a female is associated with higher inexperience errors which is in line with the results of many studies that have shown a greater propensity among women to declare more lapses (4, 6, 36) and inexperience errors (51). This lack of effect of biological sex on other types of behaviors could provide the idea to take into account social variables in explaining gender differences, supporting the idea that gender differences are fully explained by gender roles, contrary to integrationist models that suggest that gender differences are due to both biological and social factors (38). Nevertheless, the rest of the results did not support that idea.

Gender-stereotype conformity was expected to be associated with driving behaviors, replicating previous findings that showed this relationship (34). No effect of masculine stereotype conformity on driving behaviors was observed in the results of the present study. Nevertheless, feminine-stereotype conformity was negatively associated with the number of accidents. That is to say, after controlling the effect of sex, individuals who highly conform to feminine stereotypes report a lower number of accidents, which is in keeping with a previous study by Özkan et al. (34) among Turkish drivers. This effect also appears when looking at females separately. Previous findings on DBQ showed that accident involvement was predicted by violations, both retrospectively and prospectively (6), and in the present study, violations correlated with the number of accidents among females. Thus, the negative link between feminine stereotype conformity and violation and error scores that can be observed in literature (34) was not observed in the present study, but the low number of accidents among individuals who highly conform to feminine stereotypes could nevertheless be due to a lower tendency towards risky driving behaviors. Thus, it could be argued that caring for others could lead to more careful driving, and thus, fewer accidents. The results showed no relationship between accidents and masculinity. This might be due to the fact that an accident is a relatively rare event, as not all risky behaviors result in an accident. In addition, the study was conducted among young drivers, with a relatively short driving history. Nevertheless, the percentage of variance explained by gender stereotype conformity was only weak, suggesting that other social variables must be taken into account in order to explain differences between and within gender group in risky behaviors.

The third hypothesis predicted that gender identification of males and females would have an effect on driving behaviors. More particularly, it was assumed that males who strongly identified with their gender group would demonstrate greater conformity to masculine gender roles and would report more risky driving behaviors than males who weakly identified with the male gender group.

Results showed no effect of contentedness, typicality and centrality on driving behaviors among females, whereas results showed effects of typicality and contentedness on driving behaviors among males. More precisely, the typicality 'score positively predicted the

1 dangerous error 'score, whereas contentedness negatively predicted positive behaviors. In
2 other words, the dangerous errors 'score increases as a function of the male individuals
3 'feeling of typicality within their group. Thus, it seems that gender identification leads to
4 riskier driving and exhibiting more errors, in order to conform to gender roles, since risk-
5 taking is seen as a typically masculine type of behavior (28). The positive correlation between
6 centrality and violations among men seems to suggest the same. Furthermore, the positive
7 behaviors' score decreases as a function of the contentedness of belonging to the group of
8 males. Thus, it seems that high gender identification, as assessed by contentedness, leads to
9 exhibiting less positive behavior that could be socially linked to feminine stereotypes. Indeed,
10 results also showed that conformity to feminine stereotypes decreases as a function of the
11 global gender identification' score among males. Additionally, among males, contentedness
12 correlated negatively with feminine stereotype conformity, which negatively predicted the
13 number of accidents. Thus, it can be suggested that high gender identification among males
14 leads to lesser conformity to communal traits, which can lead to less positive behaviors as
15 regards contentedness level. In terms of implications, it may be helpful to attach feminine
16 characteristics (e.g. "caring for others") which were found to be related to more careful
17 driving and fewer errors (34) to masculine characteristics through role models, in driver
18 education and media campaigns.

19 The percentage of variance explained improves by adding variables of gender identity,
20 showing the importance of taking gender identification into account. Indeed, studies
21 investigating the effect of gender roles on risky behaviors used to focus on gender stereotype
22 conformity, given the relationship between masculine attributes and variables associated with
23 risk taking (39, 40). Although popular, the practice of assessing self-perceived gender
24 typicality in terms of self-perceived personality traits thus has limitations. Sex typing is
25 multidimensional (53, 54), meaning that there is only modest consistency in the degree to
26 which people display male-typical or female-typical behavior across different domains (e.g.,
27 personality traits, activity preferences, academic pursuits, and occupational preferences).
28 Thus, it could be hazardous to infer an individual's overall gender identity from self-perceived
29 sex typing in any single domain. Furthermore, the degree to which one identifies with one's
30 gender group may partly explain the conformity to attributes associated with one's gender
31 group or the other one and the behaviors associated with it. That's why it is suggested to take
32 gender identity variables into account rather than only sex-typed attributes in explaining
33 differences between and within gender group in risk-taking. Interestingly, effect of gender
34 identity variables on driving behaviors only appears among men, not among females. Plus, the
35 proportion of variance explained obtained by adding gender identity variables to the model is
36 greater among males than among females. In this type of activity, the effect of gender identity
37 must be particularly relevant among males, given that risk taking is a masculine type of
38 behaviors and that driving is an activity associated with maleness.

39 Furthermore, those results highlighted the importance of taking feminine stereotype
40 conformity into account when investigating sex and gender differences in risky driving. Most
41 of the studies investigated the effect of masculinity on risky behaviors because of the
42 relationship that exists between attributes associated with masculinity and variables associated
43 with risky behaviors, such as aggressiveness, self-enhancement and sensation seeking (35, 39,
44 40). But few studies investigated the effect of femininity on risky behaviors (34). However, it
45 can be suggested that it is the lack of femininity that leads to taking more risks instead of high
46 conformity to masculine stereotypes (37). Indeed, people can conform to both masculine and
47 feminine stereotype and it can be assumed that femininity buffers the effect of masculinity as
48 it has been shown by Özkan et al. (34).

1 The present study has some methodological limitations that have to be taken into
2 account when planning future research. First, the data was comprised of drivers' self-reported
3 behaviors, which may have limits, notably concerning the negative impact of social
4 desirability. It is possible that some respondents embellished their answers about aggressive
5 driving, although the bias caused by social desirability has been shown to be minimal in the
6 answers on the DBQ (55). Consequently, observational studies combined to surveys are
7 needed, and would allow comparison between self-reported and effective behaviors. Second,
8 the sample is relatively small, which can explain the lack of reliability of the scales and can
9 impact the validity of the results. Plus, there were clearly more female drivers than male
10 drivers in the sample, which is unbalanced. Besides, young male drivers are the most
11 problematic drivers. Next, half the sample consisted of novice drivers, so they may not
12 actually be active drivers, which can lead to less exposure to traffic situations and so, explain
13 the lack of expected results. Plus, the effect of inexperience may interact with the effects of
14 gender identity. Finally, the study has been carried out on a student sample, which may not be
15 representative of the young driver population, as psychosocial and cultural variables, such as
16 level of education, can influence people's driving behaviors and gender identity. Thus, the
17 study must be replicated in a wide sample equivalent in terms of sex, age and socioeconomic
18 status.

20 5. CONCLUSION

22 In summary, the present study showed neither the effects of sex nor masculine-stereotype
23 conformity on driving behaviors, but an effect of feminine-stereotypes on the number of
24 accidents. Plus, this study showed the effect of contentedness and typicality, respectively on
25 positive behaviors and dangerous errors among males. The proportion of variance explained
26 by sex-stereotype conformity was low but was increased by adding gender identity variables
27 to the models. Thus, even if hypotheses are not confirmed, this study can highlight the
28 importance of taking gender identity variables into account when explaining differences
29 between and within gender group in risk-taking, rather than only look at the effect of sex-
30 stereotype conformity. Furthermore, it highlighted the beneficial effect of feminine-stereotype
31 conformity on risky behaviors, suggesting that lack of femininity might be one of the key
32 factors behind high traffic accident mortality among young male drivers. Nevertheless, results
33 need to be put into perspective, given the size of the sample.

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