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What causes the differences in driving between young men and women? The effects of gender roles and sex on young drivers' driving behaviour and self-assessment of skills

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Abstract

The aim of this study was to investigate how sex (male and female) and gender roles (masculinity and femininity) and their interaction were associated with driving skills and accident involvement among young drivers. Two-hundred and seventeen young Turkish drivers (131 males and 86 females) filled in a form including the short form of Bem Sex Role Inventory (BSRI), the Driver Skill Inventory (DSI), and questions about accident history and background information. The effects of sex and gender roles were tested on outcome variables by using Poisson, negative binomial, and hierarchical regression analyses. It was found that sex (being male) predicted the number of total, active, and passive accidents, and perceptual-motor skills. While masculinity score predicted positively the perceptual-motor skills, femininity score predicted positively the safety skills. No significant interaction effects between sex and gender roles on criterion variables were found.

Keywords: Young drivers; Sex; Gender; Driving skills; Accidents

1. Introduction

Although traffic accidents kill people from all age groups, young-aged people are overrepresented in accident involvement virtually in every country, and the majority of these drivers are young men. Apart from being overrepresented in accident statistics (Blockey & Hartley, 1995; Doherty, Andrey, & MacGregor, 1998), young male drivers are also more prone to take risks (Deery, 1999), use seat belts more infrequently (Jonah & Dawson, 1987), engage in aggressive driving, speed and commit more violations (Jonah, 1990) than other age groups. The main reasons for the overrepresentation of a driver group or change in their general driving style can be specified under the three main categories as exposure, driving style, and driving skills (Laapotti, 2003).

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Exposure indicates the degree to which a driver exposes himself to traffic and to the probability of being involved in an accident. It includes both quantity (e.g., the amount of driving) and quality (e.g., why, when, where, with whom and in what kind of weather and road conditions the driving takes place) of driving (Laapotti, 2003). Exposure measures, such as the proportion of driving licence holders in each sex groups, indicate that male drivers are exposed to driving more frequently than females (IRTAD, 2003; United Nations, 1997). However, the results of earlier studies about the relationship between sex, exposure, risky driving, and accident involvement have been mixed. For instance, Hyman (1968) found that female drivers had been involved in more accidents than male drivers when the duration of driving vehicle was controlled. In contrast, Maycock, Lockwood, and Lester (1991) reported that male drivers were at a higher risk of crashing than female drivers, the crash liability of females being 30% lower than the crash liability of males after controlling for mileage.

Driving style concerns individual driving habits, i.e. the way a driver chooses to drive and, hence, generally drives (Elander, West, & French, 1993). One of the often used instruments for measuring driving style is the Driver Behaviour Questionnaire (DBQ) by Reason, Manstead, Stradling, Baxter, and Campbell (1990). DBQ makes the distinction between violations and errors. Recently, DBQ was extended to also cover positive driver behaviours (Özkan & Lajunen, 2005a). Errors were defined as a ''failure of planned actions to achieve their intended consequences that can involve the unwitting deviation of action from intention (slips and lapses) or departure of planned actions from some satisfactory path toward a desired goal (mistakes)''. Violations referred to ''deliberate deviations from those practices believed necessary to maintain the safe operation of a potentially hazardous system''. Violations are classified as aggressive and ordinary ones (Lawton, Parker, Manstead, & Stradling, 1997). In literature, it has been reported that men and young drivers tend to commit violations more frequently than women and older drivers, and that those who drive frequently violate traffic rules more often than those who drive less frequently. In contrast, female and older drivers committed more errors than male and young drivers (Åberg & Rimmö, 1998; Blockey & Hartley, 1995; Parker, McDonald, Rabbitt, & Sutcliffe, 2000; Reason et al., 1990).

Driving skills emphasise the maximum level of performance, those skills that describe what a driver can do rather than what s/he generally does (Elander et al., 1993). They can be classified into two main categories as defensive and technical driving skills (Spolander, 1983). Lajunen and Summala (1995) argued that safety related skills (defined as anticipatory accident avoidance skills) should be included in the assessment of perceptual-motor skills. The authors suggested that the distinction between perceptual-motor and safety skills is imperative because a driver's internal balance between these skills reflects his/her attitude to safety. Thus, they developed an instrument named as Driver Skill Inventory (DSI) to further assess both general perceptual-motor performance and safety concerns. By using the DSI, it was found that male drivers consistently overestimate their perceptual-motor skills, whereas safety skills are more prominent among female drivers (Lajunen, Corry, Summala, & Hartley, 1998; Lajunen & Summala, 1995).

Although sex is one of the most often measured variables in studies of driving behaviour, there have been only few studies (e.g., Kirkham & Landauer, 1985; Laapotti, 2003; Mayhew, Ferguson, Desmond, & Simpson, 2003; McKenna, Stainer, & Lewis, 1991) whose primary interest was sex differences in traffic behaviour. If the sex differences in driver behaviour have attracted only little attention among traffic researchers, gender as a social and cultural construct has been mostly ignored. According to Archer and Lloyd (2002, p. 19), gender stereotypes refer to ''the beliefs people hold about members of the categories man or woman'' while sex refers to ''the binary categories 'male' and 'female' (Archer & Lloyd, 2002, p. 17). Sex has a biological connotation and sex differences arise from innate temperamental differences between the sexes (e.g., biological theories by Buss, 1995) whereas gender is rather a social and cultural concept.

Researchers have studied the effects of macho personality on aggressive driving among male drivers and found that men endorsing a ''macho personality'' reported more aggressive driving behaviour than other men (Krahé & Fenske, 2002). It should be noted, however, that the aim of their study was not to investigate young drivers' behaviours. In addition, Krahé and Fenske (2002) studied the relationship between driving and macho personality rather than masculinity. Özkan and Lajunen (2005b) investigated how sex and gender roles are related to driving style, traffic offences and accidents among young drivers. They showed that the number of offences as well as aggressive and ordinary violations increased as a function of masculinity while the number of accidents, offences, aggressive and ordinary violations, and errors decreased as a function of femininity. Statistically significant interaction effects of masculinity and femininity on accidents and aggressive violations

were found. A high level of masculinity was related to the highest levels of accidents involvement and aggressive violations when combined with a low level of femininity. Moreover, Özkan and Lajunen (2005b) found out that young male and masculine drivers drove more than other groups. Even though the relationship between sex, gender, exposure, and driving style have been identified as correlates of overinvolvement of young male drivers in accidents, the effects of gender on perceptual-motor and safety skills have not been investigated.

According to Lajunen, Parker, and Stradling (1998), safety skills buffer the negative effects of driver anger so that drivers with high safety skills do not let their anger influence their driving. Earlier findings show that especially young men overestimate their perceptual-motor skills and emphasise vehicle-handling skills rather than safety (Lajunen & Summala, 1995). It has been suggested that overestimation of perceptual-motor skills may predispose drivers to risky driving behaviours, such as speeding and violations. Supporting this asymmetric relationship, it was found that self-reported perceptual-motor skills were positively associated with number of self-reported accidents, penalties and level of speed, whereas safety skills were negative associated with these variables (Lajunen, Corry et al., 1998; Lajunen, Parker et al., 1998; Sümer, Özkan, & Lajunen, in press).

In the present study, it was assumed that masculine drivers perceive "being a skilful driver" as a masculine characteristic, whereas feminine drivers do not see car driving as part of their identity. It was hypothesised that "being a skilful driver" is considered as a masculine feature, whereas "being a safe driver" is considered as a neutral or feminine characteristic. The aim was to investigate the effects of sex (male and female), gender (masculinity and femininity), and their interaction on self-assessed driving skills (perceptual-motor and safety skills), and accident involvement among young Turkish drivers.

2. Method

2.1. Participants

The data reported in this study were collected from 217 undergraduate students (131 males and 86 females) taking psychology courses at the Middle East Technical University in Ankara. All participants had a driving license. Questionnaires were distributed to students in classrooms. The participants were assured of anonymity and confidentiality. The participants filled out the short form of BSRI (Bem, 1981), the DSI (Lajunen & Summala, 1995), and items related to demographic variables. Characteristics for the whole sample as well as for male and female drivers separately are presented in Table 1.

2.2. Measures

2.2.1. Gender

Gender stereotypes were measured by using the short form of Bem Sex-Role Inventory, which contains three scales, namely "masculine", "feminine" and "neutral". The masculine scale (10 items) includes

Table 1
Sample characteristics

	Total	Males	Females
N	217	131	86
Age			
Mean	22.42	22.85	21.77
SD	2.65	2.77	2.31
Driving license held (years)			
Mean	3.38	3.80	2.76
SD	2.33	2.44	2.03
Lifetime mileage			
Mean	33.004	35.836	28.486
SD	111.436	83.297	146.032

characteristics that are perceived as male characteristics in society (e.g., assertive, dominant, etc.). The feminine scale (10 items) includes characteristics that are perceived as female characteristics in society (e.g., emotional, sympathetic, etc.). The rest of the inventory (10 items) consisted of neutral items that are perceived as neither male nor female characteristics (e.g., conscientious, unpredictable, etc.). The Turkish version reported in Özkan and Lajunen's (2005c) study was used. Participants assessed items on a 7-point scale (1 = almost never true and 7 = almost always true) to indicate the degree to which each of the 30 personality characteristics described them. In order to prevent loss of information, the original femininity and masculinity scores were used instead of the dichotomous classification (masculine, feminine, androgyny, and undifferentiated) of subjects employed in Bem's typology. Androgyny (high score both on masculinity and femininity) and undifferentiated (low score both on masculinity and femininity) were treated as an interactive (masculinity × femininity) concept (Cohen, 1978; Lubinski, Tellegen, & Butcher, 1981).

2.2.2. Driving skills

The Driver Skill Inventory (DSI) is a 20 item self-reported measure of perceptual-motor and safety skills (Lajunen & Summala, 1995). DSI was previously translated into English and had been shown to have good reliability and predictive validity in different Western European countries (Lajunen, Corry et al., 1998; Lajunen, Parker et al., 1998). The DSI was recently used in Turkey with high reliability and validity coefficients (e.g., Lajunen & Özkan, 2004). The original two-factor structure (perceptual motor including 13 items; e.g., ''Fluent driving'' and safety skills including seven items; e.g., ''Avoiding unnecessary risks'') was obtained in the Turkey sample. Drivers were asked to rate how weak or strong they feel they were in given skills by using 5-point scales (0 = very weak and 4 = very strong).

2.2.3. Demographic variables

Participants were asked to indicate their age, sex, number and types of accidents (active and passive accidents) and offences (parking, overtaking, speeding, and other) during the last 3 years, the number of years a full driving license held, and kilometres driven since getting a driving license (lifetime mileage).

3. Results

The data were analysed by using reliability analyses, Pearson product–moment correlations, descriptive statistics, and Poisson, negative binomial, and hierarchical regression analyses. Since a driver's risk of being involved in an accident is dependent on exposure, lifetime mileage was controlled in the analyses. Similarly, age was controlled in the analyses, because it is one of the main correlates of risky driving.

3.1. Reliabilities of scales

Reliability analyses of the BSRI answers indicated that the alpha reliability coefficients for the masculinity and femininity subscales were 0.76 and 0.80, respectively. The alpha reliabilities for the perceptual-motor skill and safety skill of DSI were 0.91 and 0.75, respectively. Thus, the reliability of the BSRI and DSI can be considered satisfactory.

3.2. Correlations between BSRI and DSI scales, background variables, and accidents

Table 2 shows the correlations between background variables, the BSRI scale scores, number of total, active, and passive traffic accidents, and DSI scale scores. Both age and mileage had a positive correlation with the number of total and passive accidents, and perceptual-motor skills. Age also had a positive correlation with the number of active accidents.

Sex (being female) was negatively related with the number of total, active, and passive accidents, and perceptual-motor skills whereas it was positively related to safety skills. As expected, masculinity had a positive correlation with perceptual-motor skills while femininity had a positive correlation with safety skills. Self-reported perceptual-motor skills were positively related with total, active and passive accidents. Safety skills were negatively related with the number of active accidents.

Table 2
Correlations among demographic variables, Bem scales, the number of accidents, and DSI scales

Variables	1	2	3	4	5	6	7	8	9
1. Age									
2. Lifetime mileage	.33***								
3. Sex (1 = male, 2 = female)	−.20**	−.03							
4. Femininity	.20**	.12	.09						
5. Masculinity	.13	.01	−.14*	.33***					
6. Number of accidents	.21**	.19**	−.31***	.03	.12				
7. Number of active accidents	.16*	.10	−.29***	.02	.09	.92***			
8. Number of passive accidents	.22***	.26***	−.25***	.05	.12	.81***	.51***		
9. Perceptual-motor skills	.27***	.19**	−.41***	.12	.35***	.25***	.15**	.31***	
10. Safety skills	−.01	.03	.14*	.33***	.04	−.13	−.18**	−.02	.06

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

3.3. Scores of drivers with high perceptual-motor versus high safety skills on outcome variables

Drivers who scored high on perceptual-motor skills and/or safety skills were grouped by using median split. As expected, drivers who scored high on safety skills had better safety records than drivers who scored higher on perceptual-motor skills. It was found that drivers with high safety skills scored lower on total (mean = 1.27), active (mean = 0.77) and passive accidents (mean = 0.50) and total offences (mean = 1.05) when compared to drivers with high perceptual-motor skills, mean scores being 1.92, 1.16, 0.75, and 2.27, respectively.

3.4. Poisson and negative binomial regression analyses on the number of accidents and offences

The number of traffic accidents was not normally distributed, as accidents are generally rare events. Thus, Poisson and negative binomial regression analyses were performed by using forward stepwise procedure. In each of the analyses, age and lifetime mileage were forced into the model to control for their effect. Then, sex, masculinity, femininity, and their interactions (sex × masculinity, sex × femininity, and masculinity × femininity) were entered.

Results revealed that the Poisson regression model was appropriate only for passive traffic accidents ($\chi^2_{202} = 213.79, p > .05$). It was inappropriate for the total number of traffic accidents and active accidents because of the significance of the goodness-of-fit chi-square indicating misfit of the Poisson distribution to data, ($\chi^2_{198} = 383.65, p < .001$) and ($\chi^2_{200} = 306.04, p < .001$), for total and active accidents, respectively. These results suggested that a negative binomial model should be used.

As shown in Table 3, both lifetime mileage and sex were significantly related to the number of total and passive accidents but only sex was significantly related to the number of active accidents. According to incidence rate ratios, which are the estimates of exp(β) instead of β, female drivers had 59% less total accidents, 54% less active accidents, and 67% less passive accidents than male drivers.

3.5. Hierarchical regression analyses

In order to investigate if there were main effects and interaction effects of sex (male and female) and gender (masculinity and femininity) on driving skills, two separate hierarchical regression analyses were performed on each of the outcome variables (perceptual-motor and safety skills). In each of these regressions, age and lifetime mileage were entered in the first step to initially control for their effect. Sex, masculinity and femininity were entered in the second step, and their interactions were entered in the third step. Following the procedure outlined by Aiken and West (1991), moderator and independent variables were first centred and then interaction term was calculated before the analyses.

Table 3
Poisson and negative binomial regression analyses on the number of accidents and offences

Variables	Incidence rate ratios (IRR)	Std. err.	Z value	(95% confidence interval)
Number of accidents as a dependent variable			Pseudo-$R^2 = .05$	
Lifetime mileage	1.00	.00	2.01*	1.00–1.00
Age	1.03	.03	1.15	0.97–1.11
Sex (1 = male, 2 = female)	.41	.08	−4.68***	0.29–0.60
Number of active accidents as a dependent variable			Pseudo-$R^2 = .04$	
Lifetime mileage	1.00	.00	0.90	0.99–1.00
Age	1.03	.03	1.07	0.97–1.11
Sex (1 = male, 2 = female)	.46	.09	−3.90***	0.31–0.68
Number of passive accidents as a dependent variable			Pseudo-$R^2 = .09$	
Lifetime mileage	1.00	.00	3.71***	1.00–1.00
Age	1.06	.04	1.74	0.99–1.14
Sex (1 = male, 2 = female)	.33	.09	−3.99***	0.19–0.57

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

Table 4
Hierarchical regression analyses on the DSI scales

Variables	Perceptual-motor skills			Safety skills		
	R^2	F	Beta	R^2	F	Beta
1. Demographic variables	.09	9.87***		.00	.21	
Lifetime mileage			.11			.04
Age			.24***			−.04
2. Sex and gender roles	.20	16.30***		.12	5.41***	
Sex (1 = male, 2 = female)			−.32***			.09
Femininity			.01			.34***
Masculinity			.28***			−.05
3. Interactions	.00	10.20***		.01	3.76***	
Sex × femininity			−.10			−.32
Sex × masculinity			−.11			.30
Femininity × masculinity			.02			.01
Total R^2	.29			.13		

dfs for F-tests: 1. step = 2, 199; 2. step = 5, 196; 3. step = 8, 193.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

As presented in Table 4, age of the drivers was related to the perceptual-motor skills. After controlling the effects of age and lifetime mileage, the results of the regression analyses in the second steps showed that male drivers reported higher perceptual-motor skills than female drivers. Masculinity was associated with the perceptual-motor skills, whereas femininity was related to the safety skills. No significant interaction effects between sex and gender roles on outcome variables were found.

4. Discussion

The results of the present study showed that sex (being male) predicted the number of total, active, and passive accidents. In contrast to previous findings (Özkan & Lajunen, 2005b), a driver's gender-role was not found to have a relationship with the number of traffic accidents. On the other hand, the results of the present study showed that self-assessed perceptual-motor skills were positively related with traffic accidents

whereas safety skills were negatively related with traffic accidents, especially with the number of active accidents. Also, drivers who scored high on safety skills had better safety records than drivers who scored higher on perceptual-motor skills in the present study. Previous studies (Sümer et al., in press) have suggested that high levels of perceptual-motor skills constitute a serious risk factor if they are not accompanied with high levels of safety skills.

Male drivers reported higher scores on perceptual-motor skills than female drivers. Although there was no significant relationship between sex, gender, and exposure in the present study, it is still possible that male drivers differ not only on the quantity of driving but also on the quality of driving, which could mean that men and women are exposed to different traffic conditions while driving (Keskinen, Ota, & Varis, 2004). There was no significant relationship between lifetime kilometres and safety skills but lifetime mileage was positively related to perceptual-motor skills. Practise and increased exposure to the diversity of traffic situations predictably result in improved skills but also increased subjective control of driving, less concern for safety, and habitual driving with narrow safety margins (Näätänen & Summala, 1976; Spolander, 1983).

The present study also showed that masculinity were associated with the perceptual-motor skills so it seems that "being a skilful driver" is seen as a masculine feature. It is known that the prototype of a "good driver" is commonly characterised with the manoeuvring skills in controlling the vehicle in Turkey (Sümer, 2001). As a result, it is possible that a 'good driver' is masculine and male and it includes only perceptual-motor skills rather safety ones even though driving skills has two separate components. Furthermore, it is a widespread belief in the public that inadequate vehicle handling skills are the major cause of traffic accidents in Turkey rather than the lack of safety skills or concerns (Sümer, 2001). It was found that female drivers did not reported higher scores on safety skills than male drivers. Rather, the present study clearly supported the view that "being a safe driver" is seen as a feminine characteristic because femininity was highly related to the safety skills.

4.1. Implications of the present study

As to the reasons for overrepresentation of young male drivers in accident involvement; it is known that exposure, driving style, and driving skills are interrelated in expressing a general driving style even though they are separated in terms of their contents and their relations to accident risk. Previous studies (Sümer et al., in press) have suggested that high levels of safety skills buffer the effect of perceptual-motor skills on risky driving. Lajunen and Summala (1995) also showed that safety skills are negatively related to risky driving and outcomes. Therefore, it is necessary to incorporate safety skills into general driving style through driver education. In this way, safe progress in traffic might be improved by preventing biased risk assessment and high level of risk acceptance (e.g., Matthews & Moran, 1986), the development of the false sense of safety, overestimation of control over traffic situations ("unrealistic optimism" and "illusion of control", McKenna, 1993) because of overconfidence to perceptual-motor skills, and indifference to messages of road safety campaigns (e.g., Ulleberg, 2002).

The results of the previous and present studies indicated that gender is influential as much as sex of drivers in expressing their general driving style. Özkan and Lajunen (2005b) reported that risky driving style increased as a function of masculinity and being male whereas it decreased as a function of femininity. Similarly, the present study showed that perceptual-motor skills increased as a function of masculinity and being male while safety skills increased as a function of femininity. It can, therefore, be concluded that the feminine characteristics of the drivers might be used to promote safety-oriented general driving style, especially among young drivers. Both sexes can have masculine and/or feminine characteristics. Since gender is a social and cultural construct rather than arises from innate temperamental differences between sexes, social psychological theories (e.g., the social role model by Eagly, 1987) might be used to reshape the relationship between gender roles of drivers and general driving style through driver education and media campaigns. In this way, some of the feminine characteristics (e.g., 'caring for others'), which were found to be related to more careful driving and fewer errors (Özkan & Lajunen, 2005b), might also be attached to masculine characteristics in the relatively patriarchal Turkish society by role models. By these approaches, policy makers might gain a new tool for improving of traffic safety. It should be noted, however, that biological and psychological explanations for these differences in driving are mutually inclusive.

4.2. The limitations of the present study

The present study has some methodological limitations that should be taken into account. First, the driver sample was relatively small and based on college students with a relatively short driving history and low percentage of car ownership. In fact, it might be one of the reasons for the lack of significant relationship between gender and the number of traffic accidents in the present study. Although an accident is most commonly an outcome of risky driving behaviours rather than another cause, it is a relatively rare event. Hence, not all risky behaviours result in an accident. Second, the data were based solely on drivers' self-reports. It is possible that some male respondents "embellished" their answers by reporting higher level of perceptual-motor skills and masculinity whereas some female respondents might have underestimated their perceptual-motor skills and masculinity. However, the respondents completed the questionnaires anonymously and could not gain anything by giving biased responses. Third, the present study was carried out in Turkey where gender roles are likely to differ from other countries (see Özkan & Lajunen, 2005c for detailed information). Therefore, there is a need to use different types of measuring techniques and instruments on diverse driver samples in other countries to further explore the possible relationships between sex, gender, and general driving style.

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