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Original article

Female and male drivers' sex roles, driver skills, and driving-related sex stereotypes

Rôles sexuels des conducteurs féminins et masculins, compétences de conduite et stéréotypes sexe liés à la conduite

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ABSTRACT

Introduction. – Differences between male and female drivers have been observed in various driving outcomes, from behaviours to crash involvement. Although sex differences among these outcomes have been extensively studied, investigating these differences by focusing on sex roles, driver skills, and stereotype endorsement for female and male drivers has not been an effort in the previous literature.
Objective. – With respect to these, the present study aimed to examine sex stereotypes associated with driving among drivers in Türkiye and how drivers' perceptions of their own sex roles and driver skills were related to these stereotypes.
Method. – In order to do that, the study was conducted with 323 drivers between the ages of 19 and 25 ($M = 21.57$, $SD = 1.57$). Participants completed a survey battery including the Bem Sex Roles Inventory (BSRI), Driver Skills Inventory (DSI), sex stereotypes associated with driving endorsement measurement (SSAD), and a demographic information form.
Results. – A series of ANOVAs and hierarchical moderated multiple regression analyses were conducted to test the relationships between the variables of the study. Results showed that females perceive female drivers as more compliant with speed rules than males, and males endorsed male drivers' driver skills more than females. In addition to direct positive relations of safety skills with speed compliance, risk avoidance, and courtesy, different two-way interactions in relation to the indexes of sex stereotypes were observed. The interaction results showed that different levels of sex roles play a role in how people endorse driving-related sex stereotypes. Additionally, it was also found that, for female and male drivers, different levels of perceptual-motor skills resulted in differences in the evaluation of specific driving-related sex stereotypes.
Conclusion. – In general, the findings indicated that sex, sex roles, and driver skills of the evaluators are important factors in understanding their relationships with the driving-related sex stereotype endorsement. The findings contributed to the literature with an additional understanding of the sex, sex roles, and stereotypes issues and are discussed in relation to dynamic relations in the traffic system.

RÉSUMÉ

Introduction. – Des différences entre les conducteurs masculins et féminins ont été observées dans divers aspects de la conduite, du comportement à l'implication dans des accidents. Bien que les différences entre les sexes aient fait l'objet d'études approfondies, l'examen de ces différences en se concentrant sur les rôles sexuels, les compétences de conduite et l'adhésion aux stéréotypes pour les conducteurs féminins et masculins n'a pas fait l'objet d'un effort dans la littérature .
Objectif. – Dans ce contexte, la présente étude visait à examiner les stéréotypes de sexe associés à la conduite chez les conducteurs en Turquie et la manière dont les perceptions qu'ont les conducteurs de leurs propres rôles sexuels et de leurs compétences à la conduite étaient liées à ces stéréotypes.

Keywords :
Stereotypes
Male drivers
Female drivers
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Mots clés :
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Conducteurs masculins
Conducteurs féminins
Rôles de sexe
Compétences des conducteurs

Méthode. – Pour ce faire, l'étude a été menée auprès de 323 conducteurs âgés de 19 à 25 ans (M = 21,57, ET = 1,57). Les participants ont rempli une batterie d'échelles comprenant le Bem Sex Roles Inventory (BSRI), le Driver Skills Inventory (DSI), la mesure des stéréotypes de sexe associés à la conduite (SSAD) et un formulaire d'informations démographiques.
Résultats. – Une série d'ANOVA et d'analyses de régression multiple modérée hiérarchique ont été réalisées pour tester les relations entre les variables de l'étude. Les résultats ont montré que les femmes perçoivent les conductrices comme plus respectueuses des règles de vitesse que les hommes, et que les hommes approuvent davantage les compétences de conduite des hommes conducteurs que les femmes. En plus des relations positives directes entre les compétences en matière de sécurité et le respect de la vitesse, l'évitement des risques et la courtoisie, différentes interactions bidirectionnelles en relation avec les indices de stéréotypes de sexe ont été observées. Les résultats de l'interaction ont montré que différents niveaux de rôles sexuels jouent un rôle dans la manière dont les gens approuvent les stéréotypes de sexe liés à la conduite automobile. De plus, il a également été constaté que, chez les conducteurs féminins et masculins, des niveaux différents d'habiletés motrices perceptuelles entraînaient des différences dans l'évaluation des stéréotypes de sexe spécifiques liés à la conduite.
Conclusion. – En général, les résultats indiquent que le sexe, les rôles sexuels et les compétences de conduite des évaluateurs sont des facteurs importants pour comprendre leurs relations avec l'approbation des stéréotypes de sexe liés à la conduite. Les résultats ont contribué à la littérature en apportant une compréhension supplémentaire des questions de sexe, de rôles sexuels et de stéréotypes et sont discutés en relation avec les relations dynamiques dans le système de circulation.

1. Introduction

1.1. Sex differences and stereotypes in driving

The sex of the drivers has been one of the core demographic variables considered in traffic and transport psychology research. Differences between female and male drivers have been observed in various driving outcomes, including aberrant behaviours (de Winter & Dodou, 2010; Deniz et al., 2021; Granie et al., 2021; Yılmaz et al., 2022), driver skills (Özkan & Lajunen, 2006; Yılmaz et al., 2022), offences (Varet et al., 2018) and crashes (Cullen et al., 2021). For instance, in a 13-year cohort study by Cullen et al. (2021), a significant involvement of novice male drivers in all forms of crashes (except for the ones resulting in hospital admission or death) compared to female drivers was reported.

In terms of self-reported behaviours, while female drivers reported more errors (de Winter & Dodou, 2010; Yılmaz et al., 2022), more adaptive behaviours to express their anger (Deniz et al., 2021), and higher anger experienced under different situations (Albentosa et al., 2018), male drivers showed higher intention to speed (Delhomme et al., 2014), more violations (de Winter & Dodou, 2010; Granie et al., 2021; King & Parker, 2008; Yılmaz et al., 2022), aggressive behaviours to express their anger (Deniz et al., 2021) and perceptual-motor skills (Özkan & Lajunen, 2006; Yılmaz et al., 2022) compared to drivers from the other sex group. In a study conducted with drivers across 32 countries, Granie et al. (2021) revealed that male drivers reported more drinking while driving, driving above the speed limits, driving without a seatbelt, and using hand-held mobile phones while driving compared to female drivers.

Similarly, different simulator studies also revealed sex differences in line with other methods (e.g., Ferrante, Varladi, & De Blasiis, 2019; Loeb, Belwadi, Maheshwari, & Shaikh, 2019; Taubman–Ben-Ari, Eherenfreund–Hager, & Prato, 2016; Üzümcüoğlu & Özkan, 2019). For instance, a study focusing on the breaking behaviours of female and male drivers revealed differences in stopping manoeuvres. With respect to the break pressure and slip ratio, male drivers were found to be stopping more carefully than female drivers (Ferrante et al., 2019). Similarly, Loeb et al. (2019) examined the emergency takeover response of male and female drivers, and it was observed that males avoided crashes more than females in an emergency takeover situation. Besides, male drivers drove more recklessly than female drivers by driving faster and spending more time over the speed limit (Taubman–Ben-Ari et al., 2016).

With respect to these differences, Dontsov and Kabalevskaya (2013) concluded that road users are able to observe behavioural differences and have certain associations between behaviours and the sex of the drivers, which could trigger stereotypes. These stereotypes are often the expectations from a group and can be useful for estimating the behaviours of an unknown individual or group at a particular moment. It has been found that gender stereotypes affect people's evaluation of the performance of females and males. The performance evaluation was affected by the sex of the performer (Ellemers, 2018). In a traffic context, drivers (also other road users) can interact with unknown female or male road users at any point in their travel. From driver to driver interaction point of view, it is reasonable to assume that drivers' behavioural expectations from other drivers can be affected by stereotypes associated with female and male drivers and ultimately affect their interactions with other drivers.

A few recent studies have investigated how different road user groups perceive female and male drivers (Degraeve et al., 2015; Granié & Papafava, 2011; Kadulina, 2022; Öztürk & Akay, 2023; Pravossoudovitch et al., 2015). In a study focusing on social representations of female and male drivers in France, Degraeve et al. (2015) found that male drivers are perceived to be more skilled, careless, and self-controlled compared to female drivers. Unlike male drivers, female drivers were evaluated as more incompetent and lack of self-control. In another study, Granié and Papafava (2011) investigated the perception of female and male drivers among road users from 10 to 16 years old. While female drivers were perceived to be bad drivers, involved in fewer accidents, and doing something non-feminine, male drivers are rated as being good drivers, aggressive, and speeding.

Several studies have investigated how stereotype threat affects driving ability through the use of driving simulators (e.g., Kadulina, 2022; Lambert et al., 2016; Moè et al., 2015; Yeung & von Hippel, 2008). Studies have revealed relatively weak and inconsistent effects (e.g., Yeung & von Hippel, 2008; Kadulina, 2022). Nevertheless, a general trend observed among female drivers indicated that the presence of stereotype threat (e.g., being reminded female

drivers are bad drivers) led to an increase in mistakes (Moè et al., 2015) and collisions (Yeung & von Hippel, 2008) and a reduction in the driving performance (Moè et al., 2015). Furthermore, older drivers exhibit slower reaction times and maintain a longer car-following distance when under stereotype threat conditions (i.e., when reminded to be bad drivers).

It has also been observed that the sex of the evaluating road user is also crucial when evaluating female and male drivers' different aspects (Degraeve et al., 2015). Males evaluate male drivers as more self-controlled and female drivers as less self-controlled than females. Besides, males also see male drivers as more careful and female drivers as less prudent than females. In another study, Pravossoudovitch et al. (2015) investigated the sex stereotypes associated with driving (SSAD) and revealed a number of differences in female and male drivers' perceptions of female and male drivers. Results showed that females evaluated female drivers as more risk avoider than males. Males saw male drivers as more skillful than females. In another study focusing evaluations at earlier ages, it was found that girls evaluated male drivers as more careless and offenders but perceived female drivers as more careful than boys (Granié & Papafava, 2011). With respect to positive characteristics, Degraeve et al. (2015) concluded that females promote female drivers while males do not do the same for male drivers. In a recent study, Kadulina (2022) examined the perceived safety among female and male drivers in three age groups. Although young female drivers were regarded as safer than their male counterparts, this trend was reversed in older age groups, where male drivers were seen as safer than female ones. Overall, driving was still mostly associated with male sex.

1.2. Sex roles

Sex roles or femininity/masculinity differentiation focuses on characteristics from behaviours to attributions that are found to be desirable or typical either for females or males (Bem, 1974). In a general sense, femininity focuses on those characteristics attributed to females, whereas characteristics associated with males constitute masculinity (Bem, 1974). Sex roles find their place in road safety research as one of the distal factors of road users leading to outcomes through behaviours and have been found to be related to different variables in different cultures (e.g., Özkan & Lajunen, 2006; Sullman et al., 2017a).

With respect to this association, a number of studies have revealed the impact of sex roles on road safety (Albentosa et al., 2018; Deniz et al., 2021; Özkan & Lajunen, 2005a, 2006; Öztürk et al., 2021; Sullman, Paxion et al., 2017; Sullman, Stephens et al., 2017). Among those studies, higher masculinity was associated with experiencing more anger (Albentosa et al., 2018), an increased number of violations (Özkan & Lajunen, 2005a), aggressive behaviours (Öztürk et al., 2021; Sullman, Paxion et al., 2017), and offences (Özkan & Lajunen, 2005a). Even primed masculinity resulted in increased speed in a driving simulator (Mast et al., 2008).

Contrary to masculinity, higher femininity was associated with decreased aberrant and dangerous behaviours such as errors, violations (Özkan & Lajunen, 2005a), aggressive behaviours (Sullman, Stephens et al., 2017), dysfunctional impulsive behaviours (Öztürk et al., 2021) and accidents (Özkan & Lajunen, 2005a). Besides, drivers with higher femininity scores reported expressing their anger in adaptive/positive ways (Öztürk et al., 2021; Sullman et al., 2017a) and showing more functional impulsive behaviours (Öztürk et al., 2021).

1.3. Driver skills

Driver skills are operationalised as what drivers are able to do (*can do*) while driving by focusing on the information-processing and motor skills of drivers (Elander et al., 1993; Parker & Stradling, 2001). The most commonly used self-reported measure of driver skills (the Driver Skills Inventory, Lajunen & Summala, 1995) differentiates those skills into two main components; perceptual-motor skills and safety skills. While the perceptual-motor skills factor focuses on the technical operation of the vehicle, such as control of the vehicle in critical situations, the safety skills factor is characterised by the safety motives of drivers as being careful or calm (Lajunen & Summala, 1995).

Literature provides evidence for the relationship between self-reported driver skills and aberrant driver behaviours, crashes, and offences. Sümer et al. (2006) found that perceptual-motor skills are positively and safety skills are negatively related to various driving outcomes; penalties, overtaking, speeding, and aggressive behaviours. Similarly, safety skills were negatively related to aberrant driver behaviours (Xu et al., 2018), accidents, and offences across different countries (Özkan & Lajunen, 2006; Wallén Warner et al., 2013; Xu et al., 2018). Contrary to the asymmetric relations of perceptual-motor skills and safety skills with unsafe driving outcomes (Sümer et al., 2006; Xu et al., 2018), positive driver behaviours showed positive relations with both aspects of the driver skills, indicating that positive driver behaviours are more likely to be exhibited by skillful and safety-oriented drivers (Öztürk & Özkan, 2018; Xu et al., 2018).

Differences in self-reported driver skills between male and female drivers have been observed across different studies (Martinussen et al., 2014; Özkan & Lajunen, 2006; Öztürk et al., 2019). While being male was positively associated with perceptual-motor skills (Martinussen et al., 2014; Özkan & Lajunen, 2006; Öztürk et al., 2019), being female was positively related to safety skills (Martinussen et al., 2014; Özkan & Lajunen, 2006). Another study conducted in Finland showed that male drivers evaluated themselves as more skilful than female drivers in 1978 and 2001 (Laapotti et al., 2003).

In addition to sex differences, only a limited number of studies have been conducted to examine the relationship between sex roles and driver skills. Studies showed positive relations between masculinity and perceptual-motor skills and femininity and safety skills. While being a skilful driver was perceived to be a masculine characteristic, being a safe driver was regarded as a feminine trait (Özkan & Lajunen, 2006; Öztürk et al., 2019).

1.4. Objectives of the present study

Despite a plethora of research on sex differences in driving outcomes, the stereotypes associated with female and male drivers were sparse. Overall, it can be emphasised that the existing literature partially supports the behavioural differences observed between male and female drivers based on their own evaluations, as well as the differences in the eyes of other road users. In order to make a contribution to the related literature, in the present study, the stereotypes associated with female and male drivers were investigated in Türkiye. This is particularly valuable because in Türkiye, gender role attitudes (Lomazzi & Seddig, 2020) and the gender gap are observable in many aspects of life (World Economic Forum, 2023). Several other studies conducted in Türkiye have also shown the presence of sex stereotypes across various domains, such as food (Basfirinci & Cilingir Uk, 2017) and marital status (Sakallı Uğurlu et al., 2021). Furthermore, in the context of driving, it is notable that driving is a male-dominated system in Türkiye. For instance, according to the Turkish Statistical Institute (2021), the sex distribution of driving license holders in Turkey has remained predominantly male. From 81% male and 19% female in 2010, it only changed to 71.8% male and 28.2% female in 2021. All this shows that the study of sex stereotypes within the traffic system in Türkiye is a topic that can make a significant contribution to the literature. To

Table 1
The characteristics of the sample.

	n	M	SD
Age	322	21.57	1.57
Sex			
Female	187		
Male	136		
Annual kilometres	315	3505.73	9678.72
Lifetime kilometres	311	8045.24	16983.94
Active accidents in the last three years	323	.59	.98
Passive accidents in the last three years	323	.27	.59
Licensing year	321	2.51	1.64

the best of our knowledge, the present study is the first study to examine sex stereotypes in the traffic system in relation to drivers' perception of their own sex roles and driver skills.

Sex stereotype endorsement studies in traffic safety research, like other ones on stereotype endorsement, examined female and male drivers' different driving-related characteristics, like skills and behaviours, that are expected to be displayed as a result of being a female or a male driver. From this understanding, it can be speculated that drivers' evaluations of their own sex roles and driver skills might affect their evaluations of other drivers' same characteristics. Considering the previous literature on and aforementioned relationships between sex roles, driver skills and behavioural outcomes and differences between female and male drivers on the mentioned relationships, it is believed that a detailed understanding of the stereotype endorsement by focusing on the self and other evaluations of drivers would provide an in-depth understanding on the effect mechanisms of stereotypes in traffic settings.

As the first study having this detailed aim for the first time in the literature, the present study examined the stereotype endorsement in relation to drivers' own evaluation of sex roles and driver skills, by considering the sex of the evaluator as well. The two main objectives of the present study could be summarized as:

- examining sex stereotype endorsement while driving in Türkiye for the first time;
- investigating sex and sex roles issues from a wider perspective in traffic settings by testing the relationships between sex, sex roles, driver skills and driving-related stereotype endorsement.

2. Method

2.1. Participants

A total of 323 drivers between the ages of 19 and 25 ($M = 21.57$, $SD = 1.57$) participated in the study from Türkiye. The sample characteristics are presented in Table 1.

2.2. Measurements

2.2.1. Demographic information form

A demographic information form was used to measure age, sex, annual kilometres driven, lifetime kilometres driven, the number of active accidents in the last three years, the number of passive accidents in the last three years and licensing year of drivers.

2.2.2. Bem sex roles inventory (BSRI)

The Bem Sex-Role Inventory measures gender stereotypes with three subscales: masculine, feminine and neutral (Bem, 1981). In the present study, the Turkish version with 20 items measuring masculine and feminine traits on a 7-point Likert-type scale ranging from 1 (almost never true) to 7 (almost always true) was used (Özkan & Lajunen, 2005b). The Cronbach's alpha reliabilities of masculinity with ten items and femininity with ten items were .80 and .81, respectively.

2.2.3. Driver skills inventory (DSI)

The Driver Skills Inventory measures drivers' evaluation of their own driving skills (Lajunen & Summala, 1995). In the present study, the Turkish version with 20 items measuring perceptual-motor skills and safety skills on a 5-point Likert-type scale ranging from 1 (very weak) to 5 (very strong) was used (Lajunen & Özkan, 2004). The Cronbach's alpha reliabilities of perceptual-motor skills with ten items and safety skills with ten items were .88 and .78, respectively.

2.2.4. Sex stereotypes associated with driving endorsement measurement (SSAD)

The endorsement of sex stereotypes associated with driving was measured with the short version of the SSAD with 15 items (Pravossoudovitch, 2016). The short version consists of four factors: compliance with speed rules with three items, driver skills with four items, risk avoidance with four items and courtesy with four items. Participants were asked to evaluate each sentence for male and female drivers separately on a 7-point Likert scale from 0 (not agree at all) to 6 (strongly agree).

Pravossoudovitch et al. (2015) determined the endorsement level via a two-step variable calculation. In the evaluation step, two sets of scores of four factors for female and male drivers were calculated separately by summing the items associated with that particular factor. Higher scores indicate a positive evaluation of the female and male drivers on the corresponding factor. For instance, a higher score of driver skills for female drivers indicates perceiving female drivers as skillful. In the stereotype endorsement step, four indexes of stereotype endorsement were calculated by subtracting participants' evaluation of female drivers from male drivers. Higher positive scores indicate female drivers as more compliant with speed rules, skilled, risk avoider and courteous. In contrast, higher negative scores mean stereotype endorsement favouring male drivers compared to drivers of other sex.

The Cronbach's alpha reliabilities of the subdimensions were .90 for compliance with speed rules, .97 for driver skills, .94 for risk avoidance, and .95 for courtesy of female drivers and .86 for compliance with speed rules, .94 for driver skills, .94 for risk avoidance and .91 for courtesy of male drivers.

2.3. Procedure

The initial translation of the SSAD was completed with a team of one translator and two psychologists who are familiar with the research area by comparing the original French version (Pravossoudovitch, 2016) and corresponding items in the translated English version (Pravossoudovitch et al., 2015). In the second step, the authors of the study finalised the Turkish version by comparing the two Turkish translations in terms of content. The final English and Turkish versions are included in Appendix A. The French version of the SSAD can be seen in Pravossoudovitch's (2016) study. After preparing the final structure of the study, ethical approval was received from the Middle East Technical University Ethics Committee (Protocol No: 480-ODTU-2019). The survey was distributed using an online survey platform (i.e., Qualtrics) through social media channels and the Department of Psychology research management system in Turkish. Participants were awarded bonus points for their participation in the system. All participants were given informed consent forms before the study and a debriefing form after the study, including the authors' contact information. The anonymity and confidentiality of the participants were ensured.

Table 2
Factor loadings of the SSAD for male and female drivers.

Factor	Item number	SSAD for male drivers		SSAD for female drivers	
		Estimate	Std. error	Estimate	Std. error
CSR	1 – I think that males (females) comply with speed limits	.85	.06	.91	.06
	5 – I think that males (females) don't break speed limits	1.14	.06	1.16	.06
	9 – I think that males (females) don't exceed speed limits	1.08	.05	1.24	.06
DS	2 – I think that males (females) are dexterous behind the wheel	1.11	.06	1.28	.06
	6 – I think that males (females) have good driving skills	1.17	.06	1.33	.06
	10 – I think that males (females) have good driving abilities	1.18	.05	1.36	.06
	13 – I think that males (females) have a good driving dexterity	1.15	.06	1.26	.06
RA	3 – I think that males (females) avoid taking risks while driving	.98	.05	1.02	.06
	7 – I think that males (females) avoid risky behaviours behind the wheel	1.13	.05	1.18	.06
	11 – I think that males (females) avoid dangerous behaviours behind the wheel	1.16	.05	1.13	.06
	14 – I think that males (females) avoid engaging in risky situations behind the wheel	1.08	.05	1.16	.05
Co	4 – I think that males (females) are courteous drivers	1.00	.06	1.18	.06
	8 – I think that males (females) are civic behind the wheel	1.15	.06	1.20	.06
	12 – I think that males (females) show politeness behind the wheel	1.10	.05	1.22	.05
	15 – I think that males (females) show consideration to other road users	1.00	.06	1.23	.06

CSR: compliance with speed rules; DS: driver skills; RA: risk avoidance; Co: courtesy.

2.4. Data and analyses

JASP 0.16.1.0 and SPSS v26 were used for analyses. A total of 406 participants completed the study. However, the number of participants below the age of 25 was quite limited. For this reason, the scope of the present study is kept for drivers between the ages of 19 and 25. In addition, outlier values in terms of last year and lifetime kilometres (z-scores over 3.5) were excluded from further analysis, resulting in the final data set with 323 participants.

Following the data cleaning, confirmatory factor analyses were conducted on male and female drivers' versions of the SSAD in order to ensure the factorial structure of the Turkish translation (see Section 6.1). The comparative fit index (CFI), root mean square error of approximation (RMSEA), χ^2/degree of freedom ratio, and standardised root mean square residual (SRMR) values were used to determine the fitness of the model. A model with the CFI above .90, RMSEA below .10, χ^2/degree of freedom ratio between 2:1 and 5:1, and SRMR below .10 was accepted as a good model (Russell, 2002; Schermelleh-Engel et al., 2003).

After examining the four-factor structure, endorsement values, together with other factors of BSRI and DSI, were calculated. All subdimensions showed high Cronbach's alpha reliability values, which were higher than .70 (Taber, 2017). The indexes of stereotype endorsement were calculated in a similar way explained in the previous study of Pravossoudovitch et al. (2015), except for the driver skills index. In the mentioned study, the index was calculated by subtracting male driver skills from female driver skills. However, in order to interpret the same direction of endorsement with the other three indexes, the index of driver skills was calculated as female driver skills minus male driver skills. In other words, although the previous scoring produced stereotypical scores where positive scores indicated a preference for male drivers over female drivers in terms of driving skills, all three other scores indicated a preference for female drivers over male drivers, which was in line with expectations. However, this may lead to some interpretation problems if it is based directly on a value being positive or negative (without taking into account the difference between factors). For this reason, we have now calculated the index in such a way that any positive value can be interpreted as a preference for female drivers, and any negative value can be interpreted as a preference for male drivers, regardless of the factor. After the variable calculations, descriptive and bivariate correlation coefficients were presented in Section 6.2.

Following that, the sex differences (Section 6.3) for each factor of BSRI, DSI and SSAD were investigated with a series of ANOVAs. Welch statistics were reported when the homogeneity of variance was violated. In the final step, the main and interaction effects of sex-sex roles (Section 6.4) or sex-driver skills (Section 6.5) on the indexes of SSAD were analysed through a series of hierarchical regression analyses. In order to do that, first, centred versions of the independent variables were calculated by subtracting the mean from each individual score, and then the interaction terms were computed by multiplying the variables (Aiken & West, 1991). In the first step, age and lifetime kilometres were entered into the model as control variables. In the second step, sex and sex roles or driver skills were entered into the model. The two-way interaction terms were entered into the model in the third step. Finally, in the fourth step, the three-way interaction terms were entered into the model. The SIMPLE syntax was used to plot significant interaction effects (O'Connor, 1998). Simple regression equations were created at low-moderate-high levels of masculinity/femininity/perceptual-motor skills/safety skills based on the means and one standard deviation above and below.

3. Results

3.1. Confirmatory factor analyses of the SSAD

Two separate CFAs were conducted to test the original four-factor structure on the male and female driver versions of the measurement (Table 2). The fit indices of the model showed acceptable values for male drivers [χ^2 (84) = 229.01, $p < .001$, CFI = .97, RMSEA = .07, SRMS = .04] and female drivers [χ^2 (84) = 286.87, $p < .001$, CFI = .96, RMSEA = .09, SRMS = .05]. The standardised factor loadings were presented in Table 2 for male drivers and female drivers.

3.2. Descriptive and correlations

The correlation coefficients of variables, together with mean and standard deviation, were presented in Table 3. A few significant relations come forward in terms of the correlations between the independent variables (driver skills and gender roles) and the dimensions of the SSAD. While femininity was positively correlated with the dimensions of SSAD for female drivers, male driver skills, male courtesy and the index of courtesy, masculinity did not show significant associations with the aspects of SSAD. Perceptual-motor skills were correlated positively with female compliance with speed rules and male driver skills and negatively with the index of driver skills. Safety skills were positively correlated with the dimensions of the female drivers SSAD, male driver skills and

Table 3
Descriptive and correlations of variables.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Age	1																		
2	Annual km	.12*	1																	
3	Lifetime km	.35***	.61***	1																
4	MAS	.06	.10	.10	1															
5	FEM	.04	−.02	−.02	.31***	1														
6	PMS	.17**	.32***	.47***	.41***	.25***	1													
7	SS	.01	.01	.05	.19**	.43***	.33***	1												
8	F_CSR	−.00	.08	.09	.08	.14**	.13*	.24***	1											
9	F_DS	−.06	−.09	−.05	.02	.21***	−.07	.17**	.27***	1										
10	F_RA	−.03	.01	.00	.04	.17**	.00	.26***	.74***	.39***	1									
11	F_Co	−.06	.00	.00	.06	.27***	.02	.23***	.60***	.56***	.71***	1								
12	M_CSR	.01	−.10	−.03	−.03	.05	.04	.08	.10	.25***	.07	.11*	1							
13	M_DS	−.11	.06	.02	.04	.23***	.12*	.15**	.34***	.39***	.38***	.39***	.25***	1						
14	M_RA	−.05	−.12*	−.06	−.01	.03	.02	.01	.04	.20***	−.03	.07	.79***	.23***	1					
15	M_Co	−.02	−.08	.02	.02	.13*	.09	.10	.04	.26***	.02	.13*	.74***	.30***	.75***	1				
16	I_CSR	−.01	.14*	.09	.08	.07	.07	.13*	.70***	.02	.52***	.38***	−.65***	.08	−.54***	−.50***	1			
17	I_DS	.04	−.13*	−.07	−.01	.01	−.17**	.04	−.04	.62***	.05	.20***	.03	−.48***	−.00	−.01	−.05	1		
18	I_RA	.02	.09	.04	.03	.10	−.03	.18**	.50***	.14*	.73***	.46***	−.49***	.11*	−.70***	−.50***	.74***	.04	1	
19	I_Co	−.04	.06	−.01	.04	.12*	−.05	.11*	.45***	.26***	.55***	.71***	−.44***	.10	−.48***	−.61***	.66***	.16**	.72**	1
Mean		*21.57*	*3505.73*	*8045.24*	*4.76*	*5.50*	*3.32*	*3.88*	*12.14*	*14.09*	*16.78*	*15.89*	*5.88*	*15.55*	*7.54*	*7.76*	*−1.46*	*8.12*	*6.26*	*9.24*
Standard deviation		*1.57*	*9678.72*	*16983.72*	*.81*	*.76*	*.69*	*.51*	*3.48*	*5.31*	*4.65*	*4.97*	*3.27*	*4.76*	*4.48*	*4.45*	*5.58*	*6.23*	*4.53*	*6.54*

Asterisks signify *p < .05, **p < .01, ***p < .001. Variables: MAS = Masculinity; FEM = Femininity; PMS = Perceptual-motor skills; SS = Safety skills; F_CSR = Compliance with speed rules of female drivers; F_DS = Driver skills of female drivers; F_RA = Risk avoidance of female drivers; F_Co = Courtesy of female drivers; M_CSR = Compliance with speed rules of male drivers; M_DS = Driver skills of male drivers; M_RA = Risk avoidance of male drivers; M_Co = courtesy of male drivers; I_CSR = Index of compliance with speed rules; I_DS = Index of driver skills; I_RA = Index of risk avoidance; I_Co = Index of courtesy.

the indexes of compliance with speed rules, risk avoidance and courtesy.

3.3. Sex difference for sex roles, self-reported driver skills and stereotype endorsement

ANOVAs were conducted to examine sex differences in factors of the BSRI, DSI and SSAD (Table 4). Sex differences were observed for femininity, perceptual-motor skills, female drivers' driver skills, female drivers' courtesy, male drivers' compliance with speed rules, male drivers' driver skills, index of compliance with speed rules and index of driver skills. Females reported higher femininity and lower perceptual-motor skills than male drivers. Moreover, female participants perceived female drivers as more skilled and more courteous, and male drivers as more compliant with speed rules and more skilled than male participants. Finally, while females endorsed female drivers' compliance with speed rules more than males, males endorsed male drivers' driver skills more than females.

3.4. The main and interaction effects of sex and sex roles on SSAD

According to the hierarchical regression analyses on stereotype endorsement through sex and sex roles (Table 5), the models for the indexes of compliance with speed rules [$F(9, 300) = 3.32$, $p < .001$], driver skills [$F(9, 300) = 4.36$, $p < .001$] and risk avoidance [$F(9, 300) = 2.12$, $p = .028$] were significant but not significant for the index of courtesy [$F(9, 300) = 1.71$, $p = .085$]. After controlling for the statistical effects of age and lifetime kilometres, only sex showed significant main effects on the indexes of compliance with speed rules (95% CI [.29, 2.39]) and driver skills (95% CI [−4.74, −2.30]). The two-way interactions of femininity and masculinity were significant for the indexes of compliance with speed rules (95% CI [−1.40, −.43]), risk avoidance (95% CI [−1.94, −.51]) and courtesy (95% CI [−1.59, −.22]). None of the other two-way or three-way interactions reached .05 significance.

The simple slope for drivers with low masculinity was marginally significant [$t(319) = 1.83$, $p = .068$] but not for those with moderate [$t(319) = .27$, $p = .786$] and high [$t(319) = -1.10$, $p = .272$] levels of masculinity on the index of compliance with speed rules (Fig. 1).

The simple slope for drivers with low masculinity was significant [$t(319) = 2.53$, $p = .012$] but not for those with moderate [$t(319) = .98$, $p = .329$] and high [$t(319) = -.54$, $p = .588$] levels of masculinity on the index of risk avoidance (Fig. 2).

The simple slope for drivers with low masculinity was significant [$t(319) = 2.66$, $p = .008$] but not for those with moderate [$t(319) = 1.50$, $p = .135$] and high [$t(319) = .20$, $p = .844$] levels of masculinity on the index of courtesy (Fig. 3).

The results showed that, in three indexes of the SSAD, similar findings were observed. That is the lowest levels of stereotype endorsement for compliance with speed rules and courtesy, in addition to the lowest levels of risk avoidance for the drivers, were reported by the participants with low femininity and masculinity scores. However, the highest levels of the mentioned aspects were reported by the ones whose masculinity scores were low but whose femininity scores were high.

3.5. The main and interaction effects of sex and driver skills on SSAD

According to the hierarchical regression analyses on stereotype endorsement through sex and driver skills (Table 6), the models for the indexes of compliance with speed rules [$F(9, 300) = 2.67$, $p = .013$], driver skills [$F(9, 300) = 4.56$, $p < .001$], risk avoidance [$F(9, 300) = 2.03$, $p = .036$] and courtesy [$F(9, 300) = 2.10$, $p = .030$] were significant. After controlling for the statistical effects of age and lifetime kilometres, the main effects of sex on the indexes of compliance with speed rules (95% CI [.27, 2.41]) and driver skills (95% CI [−4.42, −1.93]) and the main effects of safety skills on the indexes of compliance with speed rules (95% CI [.24, 2.32]), risk avoidance (95% CI [1.28, 4.27]), and courtesy (95% CI [.28, 3.16]) were significant. The two-way interactions of sex and perceptual-motor skills for the indexes of compliance with speed rules (95% CI [.10, 3.35]) and courtesy (95% CI [1.31, 5.77]) were significant. None of the other two-way or three-way interactions was significant.

The simple slopes for drivers with moderate [$t(319) = 2.10$, $p = .037$] and high [$t(319) = 3.46$, $p = .001$] levels of perceptual-motor skills were significant but not significant for those with a low level of perceptual-motor skills [$t(319) = -.38$, $p = .707$] on the index of compliance with speed rules (Fig. 4). Male drivers with moderate or high levels of perceptual-motor skills showed stronger endor-

Table 4
Sex differences in sex roles, driver skills and stereotype endorsement.

	Female		Male		df	F	*p*
	M	SD	M	SD			
Masculinity[a]	4.72	.72	4.82	.91	1,248.61	1.11	.293
Femininity	5.58	.71	5.39	.82	1,321	4.85	.028
Perceptual-motor skills[a]	3.15	.61	3.56	.71	1,264.44	29.28	<.001
Safety skills	3.87	.48	3.90	.55	1,321	.40	.527
Female drivers							
Compliance with speed rules	11.94	3.35	12.40	3.64	1,321	1.40	.238
Driver skills	16.07	4.59	11.37	5.05	1,321	76.04	<.001
Risk avoidance	17.07	4.43	16.38	4.93	1,321	1.79	.182
Courtesy[a]	16.54	4.50	14.99	5.45	1,256.17	7.41	.007
Male drivers							
Compliance with speed rules	6.22	3.16	5.41	3.37	1,321	4.86	.028
Driver skills	16.14	4.82	14.74	4.56	1,321	7.03	.008
Risk avoidance	7.71	4.41	7.32	4.58	1,321	.57	.450
Courtesy	7.96	4.35	7.49	4.58	1,321	.86	.355
Index of compliance with speed rules	8.58	4.23	7.49	6.24	1,321	6.29	.013
Index of driver skills[a]	−.07	4.72	−3.37	6.08	1,245.11	27.85	<.001
Index of risk avoidance	9.37	6.55	9.05	6.54	1,321	.19	.667
Index of courtesy	8.58	6.20	7.49	6.24	1,321	2.42	.121

[a] Welch statistics were reported.

Table 5
The roles of sex and sex roles on the indexes of stereotype endorsement.

	Index of compliance with speed rules					Index of driver skills					Index of risk avoidance					Index of courtesy				
	R^2	ΔR^2	FΔ	β	*p*	R^2	ΔR^2	FΔ	β	*p*	R^2	ΔR^2	FΔ	β	*p*	R^2	ΔR^2	FΔ	β	*p*
1. Control variables	.01	.01	1.95		.145	.01	.01	1.47		.231	.00	.00	.31		.735	.00	.00	.21		.809
Age				−.07	.235				.07	.243				−.02	.795				−.04	.535
Lifetime kilometres				.11	.060				−.10	.113				.05	.433				.00	.974
2. Main effects	.04	.03	3.03		.030	.10	.10	10.72		<.001	.01	.01	1.07		.362	.02	.02	1.52		.208
Sex (0: male, 1: female)				.15	.013				−.32	<.001				−.02	.788				−.05	.369
Femininity				.09	.132				−.06	.299				.10	.108				.11	.084
Masculinity				.04	.560				.04	.523				.00	.949				−.01	.916
3. Two-way interactions	.09	.05	4.89		.002	.12	.01	1.21		.307	.05	.04	3.89		.009	.04	.02	2.48		.061
Femininity*Masculinity				−.23	<.001				.05	.382				−.21	<.001				−.17	.009
Sex*Masculinity				−.10	.108				−.05	.434				−.08	.228				−.07	.261
Sex*Femininity				−.05	.397				.10	.086				−.02	.808				.02	.773
4. Three-way interaction	.09	.01	1.59		.209	.12	.00	.29		.590	.06	.01	3.39		.067	.05	.01	2.84		.093
Sex*Masculinity*Femininity				.12	.209				.05	.590				.17	.067				.16	.093

Note. *Df*, F-Test: 1st Step = 2,307; 2nd Step = 3,304; 3rd Step = 3,301; 4th Step = 1,300.

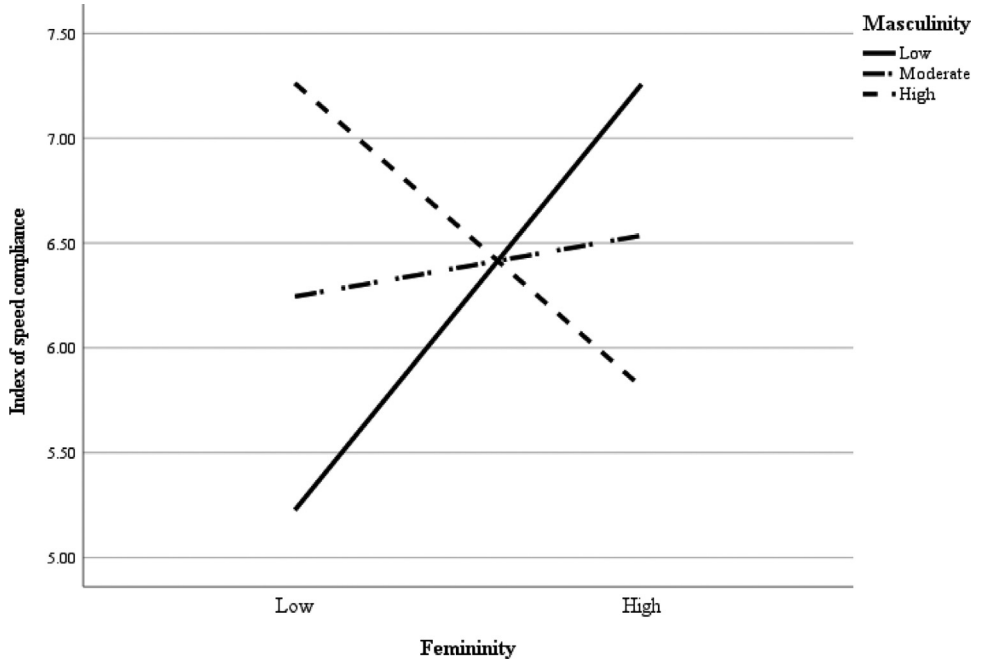

Fig. 1. The interaction between femininity and masculinity on the index of compliance with speed rules.

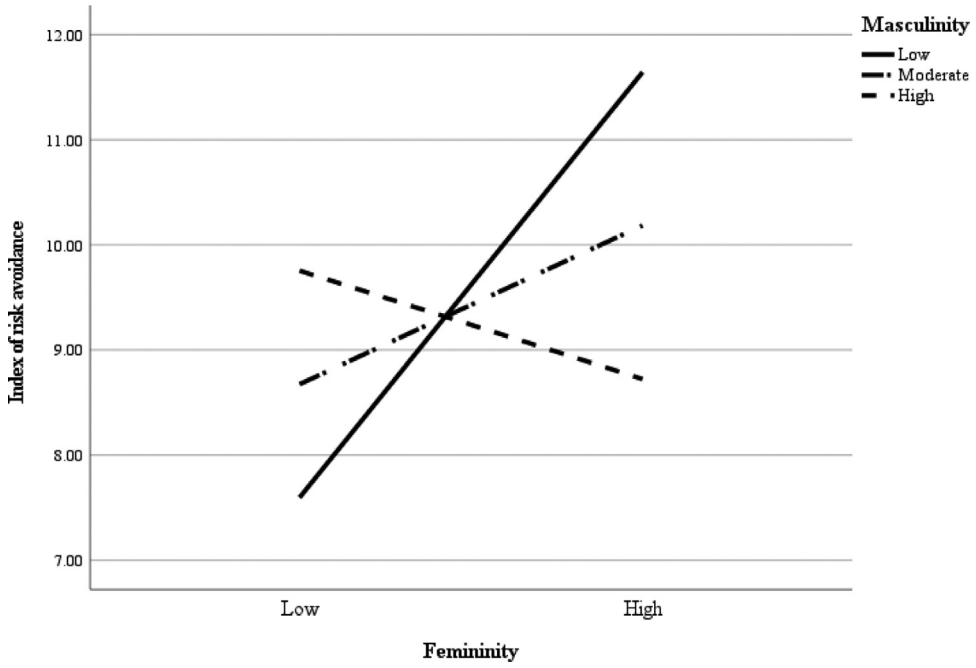

Fig. 2. The interaction between femininity and masculinity on the index of compliance with risk avoidance.

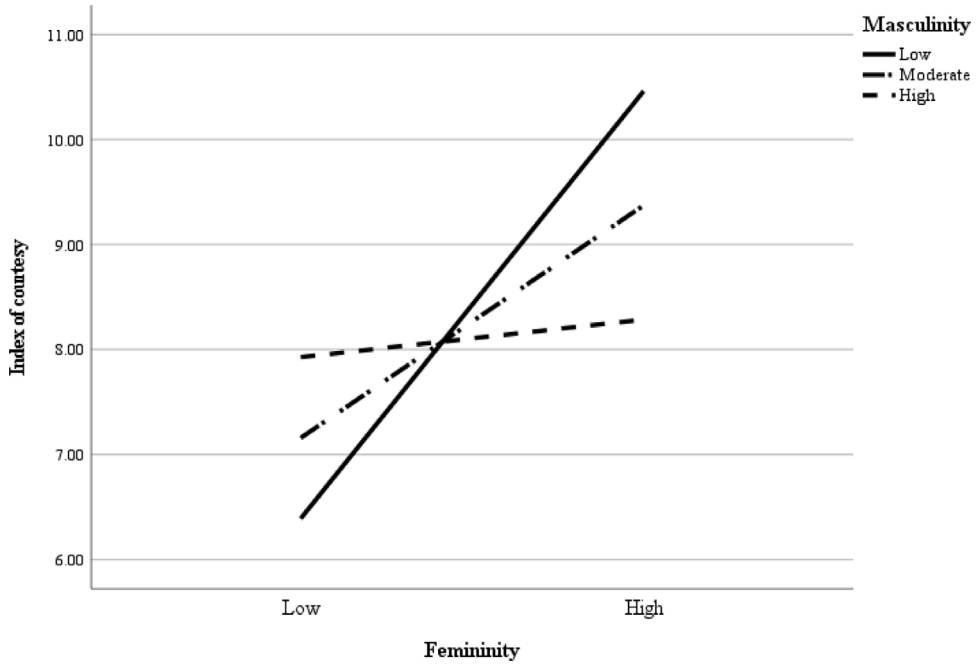

Fig. 3. The interaction between femininity and masculinity on the index of courtesy.

sement of speed compliance (i.e., perceived female drivers to be more compliant with speed rules) compared to female drivers with moderate and high levels of perceptual-motor skills.

The simple slope for drivers with a low level of perceptual-motor skills [$t(319) = -3.36$, $p = .001$] was significant but not significant for moderate [$t(319) = -1.54$, $p = .124$] and high [$t(319) = 1.28$, $p = .202$] levels of perceptual-motor skills. Compared to male drivers with low perceptual-motor skills, female drivers with a low level of perceptual-motor skills associated courtesy with female drivers more (Fig. 5).

The results showed significant results for two indexes of the SSAD. For the index of compliance with speed rules, the highest levels were reported for males with higher perceptual-motor skills. In contrast, the lowest levels of endorsement of compliance with speed rules were observed for females when perceptual-motor skills were high. The other significant results were obtained for the courtesy index. Such that the highest levels of endorsement of courtesy were observed for females with low levels of perceptual-motor skills, while the lowest courtesy scores were obtained for male drivers with low perceptual-motor skills.

Table 6
The roles of sex and driver skills on the indexes of stereotype endorsement.

	Index of compliance with speed rules					Index of driver skills					Index of risk avoidance					Index of courtesy				
	R^2	ΔR^2	FΔ	β	*p*	R^2	ΔR^2	FΔ	β	*p*	R^2	ΔR^2	FΔ	β	*p*	R^2	ΔR^2	FΔ	β	*p*
1. Demographics	.01	.01	1.95		.145	.01	.01	1.47		.231	.00	.00	.31		.735	.00	.00	.21		.809
Age				−.07	.235				.07	.243				−.02	.795				−.04	.535
Lifetime kilometres				.11	.060				−.10	.113				.05	.433				.00	.974
2. Main effects	.05	.04	3.83		.010	.11	.10	11.40		<.001	.05	.05	4.62		.004	.03	.02	2.55		.056
Sex (0: male, 1: female)				.15	.014				−.29	<.001				−.01	.882				−.05	.433
Perceptual-motor skills				−.07	.292				−.11	.102				−.13	.068				−.12	.100
Safety skills				.15	.016				.07	.257				.22	<.001				.14	.019
3. Two-way interactions	.06	.02	1.61		.186	.11	.00	.40		.752	.06	.01	1.26		.289	.06	.03	3.52		.016
Perceptual-motor*Safety				−.03	.630				−.03	.656				−.04	.506				−.02	.800
Sex*Perceptual-motor				.13	.038				−.06	.340				.11	.068				.19	.002
Sex*Safety				−.01	.825				.00	.976				−.04	.549				−.02	.794
4. Three-way interaction	.07	.00	.89		.345	.12	.01	2.45		.119	.06	.00	.00		.961	.06	.00	.10		.757
Sex*Percceptual-motor*Safety				−.06	.345				.10	.119				−.00	.961				−.02	.757

Note. *Df*, F-Test: 1st Step = 2,307; 2nd Step = 3,304; 3rd Step = 3,301; 4th Step = 1,300.

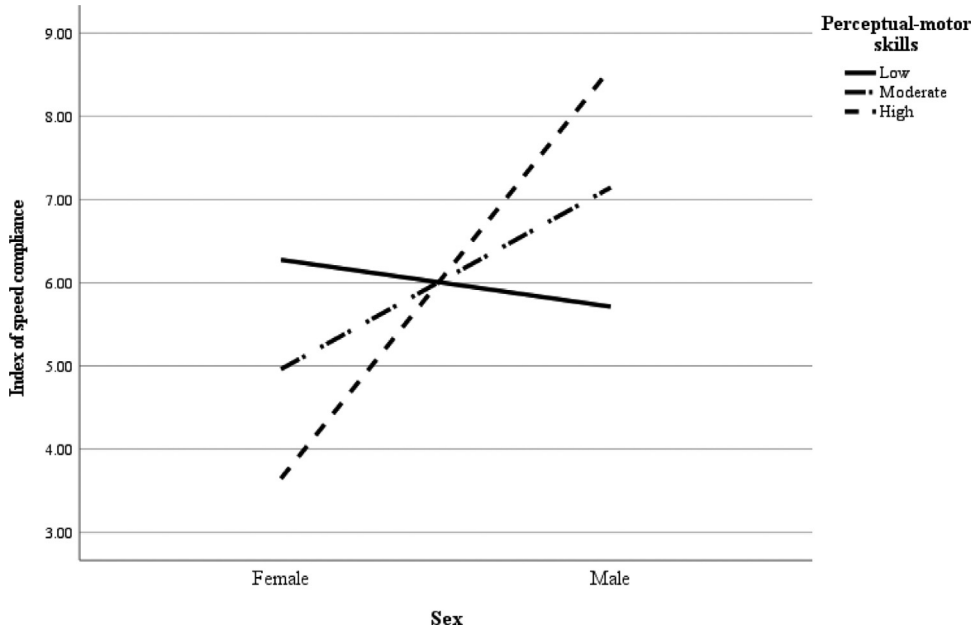

Fig. 4. The interaction between sex and perceptual-motor skills on the index of compliance with speed rules.

4. Discussion

In light of the aims of the present study (examining sex stereotype endorsement while driving in Türkiye and investigating the relation of sex, sex roles and driver skills with the stereotype endorsement), the present study focused on the sex stereotypes associated with driving among young Turkish drivers in relation to their sex, sex roles and driver skills. First of all, the SSAD measure was adapted in Turkish, and stereotype endorsement in driving was examined for the first time in this culture. Following the descriptive and correlation statistics, sex differences among study variables were presented. In the final step, the roles of sex, sex roles and driver skills were examined through a series of multiple moderated hierarchical regression analyses separately for sex roles and driver skills for the first time in the literature.

4.1. Discussion of the main findings

The adapted Turkish version of the SSAD showed acceptable values and also revealed sex differences in stereotype endorsement. In line with the findings of Granié and Papafava (2011) and Pravossoudovitch et al. (2015), differences have been observed in the evaluation of female and male drivers of road users. Females endorsed speed compliance to female drivers more, and males endorsed driver skills to male drivers more. Similar to the presentation of in-group favouritism (Tajfel et al., 1971) while evaluating the other aspects of female and male drivers (Degraeve et al., 2015), the present study shows that there could be stronger positive attribution to in-group or less positive attribution to out-group by female drivers regarding speed compliance and male drivers regarding driver skills.

The index of driver skills could be especially important because the results show that the index score of driver skills was −.07 for females, indicating relatively no difference between female and male drivers' driver skills evaluated by females. However, the index score was -3.37 for males. It could be discussed that while females' evaluation of driver skills of the two sexes is relatively similar, males evaluate male drivers as more skilled (or female drivers as less skilled; Pravossoudovitch et al., 2015). Even though masculinity scores were not directly related to stereotype endorsement, it could be suggested that being skillful is perceived to be a characteristic of a male driver more than a female driver by male drivers

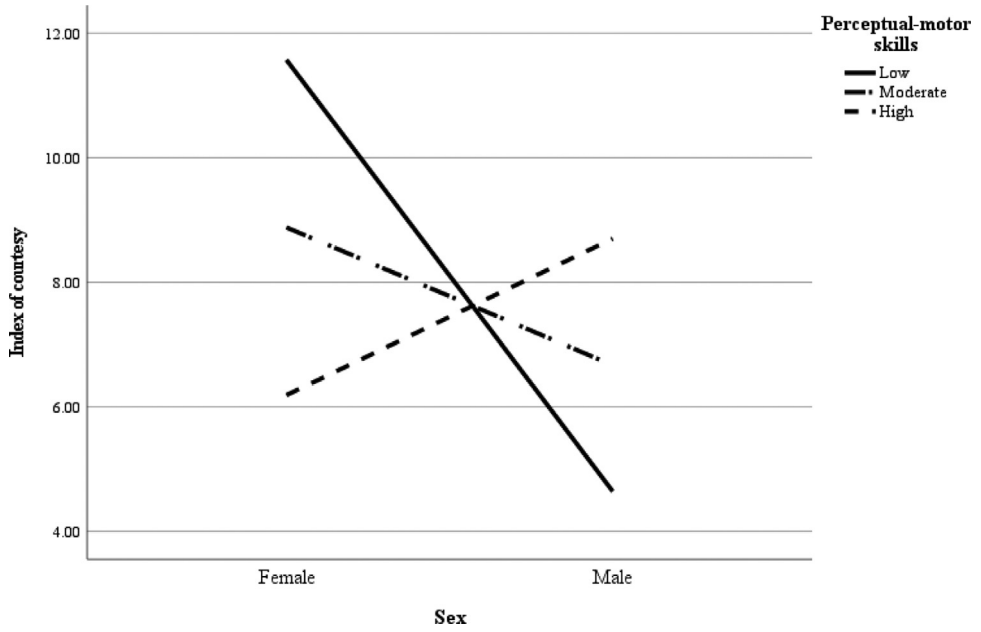

Fig. 5. The interaction between sex and perceptual-motor skills on the index of courtesy.

compared to female drivers. Based on the assumption that drivers rated female and male drivers by taking their own or peers' behaviours and skills as a reference, the difference could also be explained by the male drivers' overestimation of their own skills (Martinussen et al., 2017; White et al., 2011).

On the other hand, similar to the findings of Pravossoudovitch et al. (2015) on the compliance with speed rules and courtesy aspects, higher positive average index scores of speed compliance, risk avoidance and courtesy indicate that all participants endorsed these aspects in favour of female drivers regardless of the sex of the evaluator. Only for speed compliance, the endorsement was stronger for females than males. In terms of speeding rules, both females and males are aware of the speeding violations of male drivers (as illustrated in King and Parker, 2008) and revealed stereotypes in accordance with the previous studies indicating similar behavioural differences (e.g., Granie et al., 2021; Üzümcüoğlu & Özkan, 2019; Taubman–Ben-Ari et al., 2016). In line with the male drivers' own perception of being less cautious (Taubman-Ben-Ari, 2008) and the evaluation of adolescents perceiving female drivers to be less skilled and more safety-oriented than male drivers (Granié & Papafava, 2011), it could be speculated that, while compliance with speed rules, risk avoidance and courtesy were seen as female driver characteristics by all participants, being a good driver is perceived to be a male driver characteristic only by males.

A recent study by Gaymard et al. (2023) found, however, that older female drivers reported themselves to be comfortable in many different situations, as well as being cautious and respectful. The authors claimed that these groups of drivers did not appear to be negatively affected by stereotype threat (Gaymard et al., 2023). On the other hand, experimental studies (Moè et al., 2015; Yeung & von Hippel, 2008) showed negative effects of stereotype threat on driver behaviours. While our results confirm the self-perception of female drivers from the study of Gaymard et al. (2023), attributing a skilled driver exclusively to male drivers may have some detrimental effects on female drivers and is also related to the conclusions that female drivers make more errors while driving (de Winter & Dodou, 2010). Nevertheless, when combined with the weak and inconsistent effects found in experimental studies (e.g. Kadulina, 2022; Yeung & von Hippel, 2008), the present findings should be approached with caution and leave some areas for future research on the impact of these stereotypes on behaviour and interactions with road users.

The moderated multiple regression analyses showed that, even though there is no direct effect of sex roles, the interactions of femininity and masculinity were significant for the indexes of compliance with speed rules, risk avoidance and courtesy. For every significant interaction effect, femininity was positively associated with the indexes only for drivers with low levels of masculinity. These results were in line with the findings of Granié and Papafava (2011), revealing females being perceived as safer and more compliant with traffic rules and other studies focusing on self-reported safety skills (Martinussen et al., 2014; Özkan & Lajunen, 2006). Özkan and Lajunen (2006) showed a positive association between femininity and safety skills. Similarly, safety skills were positively associated with the female drivers' compliance with speed rules, risk avoidance and courtesy. In line with these findings, endorsement of safety-related factors to female drivers was stronger with increased femininity only for drivers with low masculinity. It can be speculated that drivers with higher femininity and lower masculinity attribute these safety-related (an attribute associated with femininity) toward female drivers.

Male drivers with moderate to high perceptual-motor skills endorsed the female drivers' compliance with speed rules compared to female drivers with moderate to high perceptual-motor skills. It could be suggested that male drivers who are skill-oriented are less concerned with the speed rules and emphasise being a skilled driver to be a masculine character (Özkan & Lajunen, 2006). This could also be an indicator of the overconfidence rising from high perceptual-motor skills, leading to being less concerned about obeying speeding rules. Besides, Granié and Papafava (2011) found that male drivers are perceived to be more careless and commit more offences. Similarly, male drivers with average or higher perceptual-motor skills might be less concerned about speeding rules and might get more tickets.

Finally, female participants with low perceptual-motor skills endorsed the female drivers' courtesy more than male participants. As discussed earlier, the courtesy aspect of the sex stereotypes is associated with being safety-oriented and feminine, which are both associated with being female (Granié & Papafava, 2011). From the opposite point of view, male drivers' more neutral endorsement of

courtesy might be because of the lack of confidence coming from low perceptual-motor skills. In other words, the findings indicate that male drivers with low perceptual-motor skills are the ones with the lowest endorsement of female drivers' courtesy. Combined with the results above, male drivers perceiving themselves as low in perceptual-motor skills might be perceiving male drivers to be more obedient to speed rules and also more courteous.

Various studies have highlighted the significance of culture in the context of sex roles (e.g. Mueller & Conway Dato-on, 2013) and have explored the differences in sex stereotypes across cultures (e.g. Mueller & Conway Dato-on, 2013). As previously highlighted, studies show that sex stereotype endorsement in Türkiye is similar to that in France (e.g. Granié & Papafava, 2011). However, there were also some differences between the two countries. For example, thanks to a point made by one of the reviewers, females were more likely to attribute speed compliance to their in-group in Türkiye but not in France, whereas females were more likely to attribute risk avoidance to their in-group in France but not in Türkiye. Moreover, regardless of the sex of the evaluator, driving skills is always attributed to male drivers. The similarity in results is unsurprising given that both countries have comparable levels of masculinity scores (43 for France and 45 for Türkiye), as demonstrated by the country-level scores provided by Hofstede Insights (n.d.), even though Türkiye has shown much stronger gender role attitudes compared to France (Lomazzi & Seddig, 2020). It can be speculated that the significant differentiation between the stereotypes against male and female drivers may indicate a strong perception of driving as a gendered activity (such as being a skilled driver). In other words, while the technical aspects of driving (i.e., being a skilled driver) are more strongly associated with males, other components are more strongly associated with female drivers in Türkiye, again in line with gender role attributes (Lomazzi & Seddig, 2020). Therefore, further cross-cultural studies are necessary to examine sex stereotypes in traffic contexts to acquire more detailed information.

4.2. Limitations and future suggestions

There are some critical remarks that could be mentioned about the present study especially while interpreting the findings. First of all, the sample consists of only young drivers. Although the aim of the present study was not to focus on a specific group of drivers, it was thought that studying with young drivers would be a good starting point as the literature indicated characteristic risk factors, like cognitive skills and social influence, requiring different interventions for young people (Cassarino & Murphy, 2018; Öztürk & Öz, 2021). So, understanding young drivers in more detail could provide a base for developing specific interventions as well as for constructing future studies which could be designed for group comparison purposes. The findings of such studies might also show differences across different age groups, considering the age-related differences in sex stereotypes (Pravossoudovitch et al., 2015). Given the differences in sex stereotypes between different age groups (Pravossoudovitch et al., 2015), it can be speculated that drivers' perceptions of female and male drivers may change over time and with exposure. Similarly, drivers' own driving skills are likely to improve as they gain more experience (Lajunen & Özkan, 2021). For this reason, we suggest that this topic should be further explored with drivers from different age and experience groups for generalisability.

As discussed by Yılmaz et al. (2022), social desirability might be affecting the results of the current study, such as through participants' evaluation of their own driving skills with the Driver Skills Inventory. Even though anonymity and confidentiality were ensured to prevent participants from lying, socially desirable responses might be an issue, especially when evaluating female and male drivers. Of course, as mentioned above, the DSI does not measure actual skills but rather drivers' perceptions of their own skills (Lajunen & Özkan, 2021). In this case, overestimation of one's own driver skill, a methodological issue with self-reported driver skills (Sundström, 2008), could also be a problem with the SSAD in addition to driver skills because it is not known the reference point of female and male drivers in the mind of an evaluator. Similarly, it should also be mentioned that previous studies have revealed that male drivers are inconsistent in self-evaluation of their own skills (Martinussen et al., 2017) and are more optimistic (White et al., 2011). However, even if the biases may be systematic, it is reasonable to assume that the direction of the relationship will be similar as we have approached it from both drivers' perceptions of themselves and others. Considering this, other measurement methods, such as implicit measures or more subjective measures, might help to draw more concrete results.

These stereotypes can have lasting impacts on multiple facets of driving and everyday experiences. For instance, Anne et al. (2023) carried out an experimental study with driving schools in France and found that females were offered longer training hours than males. For this reason, we encourage further research in this area. Finally, Granie et al. (2021) found that sex differences in driving outcomes vary from country to country, indicating regional differences. Considering that, the findings of the current study could have limited generalisability and further research areas to be explored.

5. Conclusion

In conclusion, examining sex stereotypes is important to shed light on the interactions of drivers in the traffic context, especially in critical situations such as tailgating and overtaking where more active interaction is needed. For this reason, it is believed that a better understanding of this construct will be helpful for the development of intervention programs as well as a safe driving environment. First of all, the fit indexes of both female and male versions of SSAD were found to be acceptable, suggesting that the Turkish version of the SSAD was reliable to be used. All in all, it could be concluded that the findings of the present study provided evidence with respect to the sex stereotype endorsement among young drivers in Türkiye and similar patterns of relationships with the sex of the evaluator highlighted in a previous study with French drivers (Pravossoudovitch et al., 2015). It has also been shown that together with sex, sex roles and driver skills have interaction effects in relation to road users' evaluation of female and male drivers. The results indicated that, along with the sex of the drivers, drivers' own evaluation of sex roles and driver skills were related to the perception of other drivers. It can be suggested that future intervention or training programs focusing on stereotype endorsement should also take into account drivers' own points of view. Given the nature of our sample and the significant associations, the topic can be incorporated into novice driver training programmes. Incorporating the current topic, for example, by providing mentoring opportunities (Glendon, 2014) from the opposite sex for young male drivers, may allow for less biased perceptions of drivers.

Ethics statement

This research project was conducted with full compliance of research ethics norms, and more specifically the codes and practices established the Declaration of Helsinki. Ethical approval was received from the Middle East Technical University Ethics Committee at Ankara (Protocol No: 480-ODTU-2019).

Data availability statement

The data that support the findings of this study are available on request from the corresponding author (I.O., i.ozturk@leeds.ac.uk).

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Author contribution

İbrahim Öztürk: conceptualisation, methodology, investigation, formal analysis, writing - original draft, writing - review & editing, project administration. Bahar Öz: conceptualisation, methodology, writing - original draft, writing - review & editing, supervision.

Disclosure of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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The authors do not have any conflict of interest to declare.

Appendix A. Supplementary data

Supplementary data (Appendix A) associated with this article can be found, in the online version, at https://doi.org/10.1016/j.erap.2024.101026.

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