

Araştırma Makalesi

The Role of Sex in Evaluating Other Male and Female Drivers' Driving Skills and Behavior

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Abstract

Countries with wider gender gap might host sex-based stereotypical evaluations, which might be present from the early ages and persist. It might also hinder the stereotyped groups' performance on the stereotyped field, such as driving (Granié and Papafava, 2011; Moè, Cadinu, & Maass, 2015; Steele & Aronson, 1995). Although the effect of sex and gender roles in self-evaluated driving skills and behaviors are studied, the possible effect of sex in evaluating other male and female drivers in their driving skills and behaviors was not a topic of interest in road safety studies. Thus, the aim of the current study was to investigate whether sex of the participants was a significant factor in evaluating other male and female drivers' driving skills and behavior. 92 Female and 70 male drivers participated in the study. Participants were asked to fill forms of Driver Skill Inventory (DSI) and Driver Behavior Questionnaire (DBQ) to assess driving skills and behaviors of other male and female drivers. The results indicated significant differences between male and female participants in evaluations of other female drivers' perceptual-motor skills, safety skills, and driving errors. In line with the literature, female drivers were endorsed for their safety skills, and male participants were endorsed for their perceptual motor skills. Similarly, female drivers received higher mean values for lapses and male drivers received higher mean values for errors, aggressive violations, and ordinary violations. Results are important in raising awareness regarding sex-based stereotypical evaluations of drivers, especially towards female drivers, in Turkey.

Keywords: driver skill inventory, driver behavior questionnaire, female drivers, stereotype

Cinsiyetin Diğer Erkek ve Kadın Sürücülerin Sürüş Becerileri ve Davranışlarının Değerlendirilmesindeki Rolü

Öz

Araştırmalar, cinsiyet eşitsizliğinin ön planda olduğu ülkelerde cinsiyet temelli basmakalıp inanışların bulunabileceğini ve bu inanışların bireylerde erken yaşlarda yer edinmeye başlayıp daha sonra da devam edebileceğini göstermiştir. Ayrıca basmakalıp inanışların, bu inanışlara maruz kalan grubun sürüş gibi performansları üzerinde olumsuz etkisi olduğu da raporlanmıştır (Granié and Papafava, 2011; Moè, Cadinu, & Maass, 2015; Steele & Aronson, 1995). Cinsiyet ve cinsiyet rollerinin öz beyana dayalı sürüş becerileri ve davranışları ölçümlerine olan etkileri çalışılmış olsa da, cinsiyetin diğer erkek ve diğer kadın sürücülerin sürüş becerileri ve davranışlarının değerlendirilmesindeki muhtemel etkisi üzerinde yeterince yoğunlaşmamıştır. Bu nedenle mevcut çalışma, katılımcıların cinsiyetinin diğer erkek ve kadın sürücülerin sürüş becerileri ve davranışlarının değerlendirilmesinde belirgin bir faktör olup olmadığını araştırmayı amaçlamıştır. Çalışmaya 92 kadın ve 70 erkek sürücü dahil olmuştur. Katılımcılara Sürücü Becerileri Ölçeği ve Sürücü Davranışları Ölçeği formları, kadın ve erkek sürücülerini değerlendirecekleri şekilde sunulmuştur. Sonuçlar erkek ve kadın katılımcıların kadın sürücülerin algı-motor becerileri, güvenlik becerileri ve sürüş hatalarına yönelik yapmış oldukları değerlendirmeler arasında belirgin fark olduğunu ortaya koymuştur. Alanyazın ile uygun şekilde kadın sürücüler genel olarak güvenlik becerileri bakımından, erkek katılımcılar ise algı-motor becerileri bakımından becerikli olarak değerlendirilmiştir. Yine alanyazınla uygun şekilde kadın sürücüler dalgınlıklar bakımından daha yüksek ortalama değerler elde ederken, erkek sürücüler hatalar, saldırgan ihlaller ve sıradan ihlaller alt ölçeklerinde daha yüksek ortalama ile değerlendirilmiştir. Sonuçlar, Türkiye'de özellikle kadın sürücülere yönelik cinsiyet temelli basmakalıp inanışlara dair farkındalık oluşturabilmesi adına değerlidir.

Anahtar kelimeler: sürücü becerileri ölçeği, sürücü davranışları ölçeği, kadın sürücüler, stereotip

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The Role of Sex in Evaluating Other Male and Female Drivers' Driving Skills and Behavior

Before the detailed investigation about the possible sources and the differences related to road traffic accidents, some of the basics of the road safety should be stressed. According to Özkan and Lajunen (2011), the accidents are the conjoint product of human factors and situation which includes vehicle and the traffic environment. Human factors that lead to road accidents can be explained under many topics such as driver skills, driving style, personality, speeding, young and old age, fatigue, inexperience, overestimation of driving skills, diminished cognitive and psychomotor functions, panic reaction, incorrect evaluation of the situation, inattention, impaired vision and hearing, inappropriate overtaking, familiarity with road, driving under substance effect, and so on (Akanbi, Charles-Owaba & Oluleye, 2009; Bucsházy, Matuchová, Zůvala, Moravcová, Kostíková & Mikulec, 2020; Eleander, West & French, 1993; Zhang, Jing, Sun, Fang & Feng, 2019). Driving skills and behaviors are factors related to road safety that are investigated in numerous traffic studies. The focus of the current study was also driving skills and behaviors; however, apart from the majority of the literature, it focuses on how sex might affect the evaluations of other drivers in their driving skills and behavior, rather than measuring self-evaluated driving skills and behavior.

1.1. Driving Skills, Driver Behaviors, and Road Safety

Driver behaviors are defined as the way drivers prefer to use the vehicle (Özkan & Lajunen, 2011), and are measured with Driver Behavior Questionnaire (DBQ) developed by Reason, Manstead, Stradling, Baxter and Campbell in 1990. DBQ is a frequently used tool for the self-evaluation of driving behaviors (Bener, Yildirim, Bolat, Özkan, & Lajunen, 2016; Martinussen, Hakamies-Blomqvist, Møller, Özkan & Lajunen, 2013), and measures driving behavior on three dimensions, which are the violations, errors, and lapses (Reason, et al., 1990). Violations are defined as deliberate actions in driving that violate the traffic laws and practices of safe driving, while the errors are defined as unintended actions that might put drivers in danger; and the lapses are defined as faults in cognitive processes that might or might not lead to dangerous outcomes (Stephens & Fitzharris 2016). Various versions of DBQ are translated and validated in numerous countries like Australia (Stephens & Fitzharris 2016), France (Guého, Granié, & Abric, 2014), Finland and The Netherlands (Lajunen, Parker, & Summala, 2004), Portugal (Dourado, Marques, Pereira, Nogueira, Macedo, Silva & Seco, 2017) and Turkey (Lajunen & Özkan, 2004), and the factors suggested by the original study (Reason et al., 1990) were confirmed. Driver skills are defined as the cognitive and motor capabilities of the driver (Özkan & Lajunen, 2011), and are frequently measured with Driver Skill Inventory (DSI), which is developed by Lajunen and Summala (1995). DSI consists of two components, which are perceptual-motor skills and safety skills (Özkan, Lajunen, Chliaoutakis, Parker & Summala, 2006). DSI is translated, validated and utilized in numerous countries such as Australia and Finland (Lajunen, Corry, Summala, & Hartley, 1998), Iran, Greece and Turkey (Özkan, et. al., 2006), and Germany (Ostapczuk, Joseph, Pufal, & Musch, 2017), and yielded good results of reliability and validity. Self-assessed driving skills and behaviors are demonstrated to have good value in predicting accident involvement (af Wählberg, Dorn & Kline 2011; de Winter & Dodou, 2010). Therefore, use of DSI and DBQ are convenient methods for studying some human factors related to the road safety.

1.2. Stereotypical Evaluations Based on Sex and Road Safety

As self-assessed driving skills and behaviors are found to be promising in studying road safety, the current study assumes that evaluations of other drivers' driving skills and behavior, especially based on sex, might also be beneficial in studying road safety. Various research

suggested that stereotypical evaluations related to drivers based on gender and sex exist. It is beneficial to consider that the term “sex” is considered as biological, whereas the term “gender” is considered as cultural, even though some authors use these terms interchangeably (Muehlenhard & Peterson, 2011). Research suggested that younger male drivers were perceived as more aggressive than older male and female drivers (Davies & Patel, 2005). In a study for which a questionnaire of stereotypical views associated with driving was developed, it was reported that female participants attributed risk avoidance to female drivers more than males, while the male participants endorsed male drivers’ driving skills more than females, emphasizing gender-based stereotypical evaluations in driving (Pravossoudovitch, Martha, Cury & Granié, 2015). Granié and Papafava (2011) reported that female drivers were associated with poor driving skills and with frequently being involved in road accidents. The same study also reported that such stereotypes regarding female drivers could exist even at the age of adolescence. In the case of Turkey, studies demonstrated masculinity score and being male was positively associated with perceptual-motor skills dimension of DSI, whereas femininity score was positively associated with the safety skills dimension (Özkan & Lajunen, 2006). In another study, being male was found to be associated with ordinary violations dimension of DBQ, while masculinity score was positively associated with both aggressive and ordinary violations dimensions, and femininity score was negatively associated with aggressive and ordinary violations, and errors dimensions in DBQ (Özkan & Lajunen, 2005a). Another study conducted with Turkish participants using DBQ and DSI reported that masculinity score was positively associated with violations while femininity score was negatively associated with violations, and both femininity and masculinity were positively associated with positive driver behaviors and perceptual-motor skills (Öztürk, Fındık & Özkan, 2019). On the other hand, sex differences were limited to higher perceptual-motor skills in male participants and higher lapses in female participants (Öztürk, Fındık & Özkan, 2019). Sex differences in accident involvement is a significant issue in Turkey. Even though the lowest number of traffic accidents since 2009 and the lowest number of accidents with death or injuries since 2012 were recorded in 2020, the recorded number of total crashes still indicates undesired levels of road safety in Turkey, and the sex disparity in accident involvement persists over the years regardless from the total number of road accidents. According to Turkish Statistical Institute (TSI) report (2021), 79% of over 4800 road users that had lost their lives in road accidents and 71% of over 226,000 road users that were injured in road accidents were males in 2020. The numbers for male involvement in accidents with death or injuries were 76% for deaths and 67% for injuries in 2019; 75% for deaths and 67% for injuries in 2018; and 76% for deaths and 68% for injuries in 2017 (TSI, 2018; TSI, 2019; TSI, 2020). The consistent pattern in higher male road user deaths and injuries over the years in Turkey makes investigating possible sources of the difference between sexes meaningful. When it is considered that Turkey is ranked as the 133th out of 156 countries in gender gap index (World Economic Forum, 2021), gender-based discrimination and stereotyping were assumed as a possible factor in understanding sex differences in accidents in Turkey. As defined in Moè, Cadinu, and Maass (2015), stereotypes are cultural phenomena and are transmitted through social experiences, and these stereotypes might have an impact on driver performance. The impact of driver sex and related stereotypical evaluations in road safety can vary for males and females. For example, Bucsuházy et al. (2020) reported that women are prone to experience road accidents due to panic reaction and inattentiveness, because women are more prone to experience driving anxiety and fear than men (Taylor, Alpass, Stephens & Towers, 2011), and give emotional responses such as panic reaction, whereas men are more prone to experience road accidents due to not being able to evaluate the situation correctly, inattentiveness, inexperience, and unfamiliarity with road. Therefore, it is assumed that while overestimation of driving skills might lead to a risky driving style and cause

accidents in men, stereotypical views of women in traffic might lead to anxiety and fear, and threaten road safety (Bucsuházy et al., 2020).

In the light of the information given above, it is assumed that Turkish drivers hold stereotypical evaluations of male and female drivers' driving skills and behavior, which is assumed to be a helpful phenomenon in explaining sex differences in accident involvement. Therefore, the aim of the current study was to investigate the possible difference in how drivers of different sex evaluate drivers of their own sex and the other sex in driving skills and behavior. To obtain more robust results, our analysis included self-esteem and locus of control as control variables, as it was reported that locus of control, which is whether individuals make causal attributions to external or internal factors for their performance or events, was influential in stereotype studies (Cadinu, Maass, Lombardo & Frigerio, 2006), and self-esteem was found to be a moderator variable in stereotype effect (Rydell & Boucher, 2010) and higher self-esteem was said to lead to greater self-enhancement (Tesser, 1988). Rather than general locus of control, our study utilized the traffic locus of control scale (T-LOC) (Özkan & Lajunen, 2005b), which measures the locus of control in traffic setting. Self-esteem was measured with Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1965). To authors' knowledge, the inclusion of locus of control and self-esteem to the analysis was a unique contribution of the current study to driving skill and behavior evaluations of other drivers in traffic studies. In addition, as other studies investigated the effect of gender roles and sex in self-evaluated driving skill and behavior scores in Turkish context (Özkan & Lajunen, 2005a; Özkan & Lajunen, 2006; Öztürk, Fındık & Özkan, 2019), another unique contribution of the current study was demonstrating how evaluating driving skills and behaviors of the drivers of own sex and the other sex might differ based on the participants' sex.

2. Method

2.1. Participants

A total of 181 participants were obtained from Middle East Technical University students and outside of the university with the snowball method. As the focal point of the current study was to observe the group differences of sex in evaluating own and the other sex of drivers, three data were removed for demonstrating straight-line response pattern throughout the questionnaire. 16 data were removed for taking too little (under 5 minutes) or too much (above 100 minutes) time to finish the survey. It took approximately 20 minutes for every participant to finish the survey. The final sample was consisted of 162 participants (92 females). Having a driver's license was compulsory to participate in the study.

2.2. Materials

2.2.1. Demographics Questionnaire.

In order to obtain descriptive information regarding the sample, participants were given a short survey asking about age, sex, whether they are actively driving, how many years they have their driving license, how many accidents they had for the last three years, how many fines they have received for the last three years, and how fast they use the vehicle in urban or inter-urban roads.

2.2.2. Traffic Locus of Control Scale.

Traffic Locus of Control Scale (T-LOC) was developed by Özkan & Lajunen (2005b) and modified by Özkan, Lajunen and Kaistinen (2005), and it measures whether drivers attribute accidents to internal or external factors through four dimensions. These dimensions are "Other drivers" (6 items), "Self" (5 items), "Vehicle and environment" (3 items), "Fate" (3 items). Participants answered 17 items with 5 Likert-type choices ranging from 1 to 5 (1=Not at all

possible, 5=Highly possible), and evaluated whether or not getting into accidents depends on other drivers, self, vehicle and environment, or fate. Higher scores indicated whether the participants attribute road accidents to others, self, vehicle and environment, or fate. Internal reliability analysis of the T-LOC in the current study for other drivers, self, vehicle and environment, and fate yielded Cronbach's alpha coefficients of .76, .79, .68, and .72.

2.2.3. Rosenberg Self-Esteem Scale.

Rosenberg Self-Esteem Scale (RSES), which measures how much value one gives to self (Blascovich & Tomaka, 1991) was developed by Rosenberg (1965) and became one of the most frequently used self-esteem measurement tools in psychological research (Blascovich & Tomaka, 1991). RSES form utilized in the current study was translated to Turkish by Çuhadaroğlu (1986). The scale is consisted of 10 statements such as "I take a positive attitude toward myself" which participants evaluate on 4 Likert-type choices ranging from 1 to 4 (1=Strongly disagree, 4=Strongly agree). Minimum obtainable score was 10 and maximum obtainable score was 40, with higher scores indicating higher self-esteem. Five of the items are reverse scored. Internal reliability analysis of the RSES in the current study yielded a Cronbach's alpha coefficient of .91.

2.2.4. Driver Skill Inventory.

Participants' evaluations of perceptual-motor skills and safety skills were obtained with Driver Skill Inventory (DSI), which is developed by Lajunen and Summala in 1995, and translated to Turkish by Sümer and Özkan (2002). DSI is consisted of 20 items (10 items for perceptual-motor skills and 10 items for safety skills) which participants evaluate themselves on a 5 Likert-type choices (1 = Very poor, 5 = Very strong). In order to ask for driving skills evaluations for male and female drivers, two equivalent forms of DSI were prepared for the current study. For example, the item "Conforming to the speed limits" was reframed as "Male drivers conform to the speed limits" for the male version of the DSI and "Female drivers conform to the speed limits" for the female version of the DSI. By doing so, the questionnaire was modified in order to let participants evaluate their own sex and the other sex in driving skills, rather than evaluate themselves in driving skills. Internal reliability analysis of perceptual-motor skills and safety skills dimensions of the male version of DSI yielded Cronbach's alpha coefficients of .78 and .73. For the female version of the DSI, perceptual-motor skills and safety skills dimensions yielded Cronbach's alpha coefficients of .86 and .76.

2.2.5. Driver Behavior Questionnaire.

Participants' evaluations of driver behaviors were obtained with Driver Behavior Questionnaire (DBQ; Reason et al., 1990), which is translated to Turkish by Lajunen and Özkan (2004). There are 42-item and 28-item versions of DBQ, and as the current study required filling DBQ for both male and female drivers similar to DSI, 28-item version (8 items for lapses, 8 items for errors, 3 items for aggressive violations, and 9 items for ordinary violations) of the DBQ was used to prepare two forms of DBQ for evaluating male and female drivers' driver behaviors. Rather than asking "How often the given situations have happened to you", participants were asked "How often the given situations might be happening to male drivers?" and "How often the given situations might be happening to female drivers?" for the participants to rate male and female drivers on items such as "Hit something when reversing that you had not previously seen". Internal reliability analysis of lapses, errors, aggressive violations, and ordinary violations of the male version of the DBQ yielded Cronbach's alpha coefficients of .80, .86, .83 and .92; and .82, .86, .70 and .85 for the female version of the DBQ.

2.3. Procedure

The ethical approval for the study was given by Middle East Technical University Human Subjects Ethics Committee. An online surveying platform, Qualtrics was utilized to distribute the survey to the participants. Participants filled an informed consent form before beginning the survey. After filling the demographics questionnaire, participants filled in T-LOC and RSES. Demonstration of T-LOC and RSES was randomized. Afterwards, participants filled male and female forms of DSI and DBQ, and the presentation order of DSI and DBQ, and the male and female forms were randomized. Participants from METU received bonus points for their classes for their participation, and participants outside of the university that are recruited with snowball sampling method did not receive incentives for their participation.

2.4. Analysis

A descriptive analysis to observe mean, standard deviation, minimum and maximum values, frequencies and percentages for the demographic information was conducted. A series of independent samples t-tests were run to observe possible group differences in demographic informations and control variables, which were self-esteem and locus of control. A multivariate analysis of covariance (MANCOVA) was run to investigate the difference in how male and female participants evaluated male and female drivers' driving skills and driving behaviors, while controlling the effects of locus of control and self-esteem. Evaluations for male and female drivers' perceptual-motor skills, safety skills, lapses, errors, aggressive violations, and ordinary violations were compared together in graphs to observe how the participant's sex affects the evaluations. The Statistical Package for the Social Sciences (SPSS) program was used to run the analysis.

3. Results

3.1. Descriptive Statistics

The sample consisted of 162 participants, with 70 males (43.2%) and 92 females (56.8%). Mean age for male participants was 28.40 ($SD = 12.34$), while the mean age for female participants was 26.17 ($SD = 9.85$). Independent samples t-test results demonstrated that there were no significant differences of mean age between male and female groups, $t(160) = 1.27, p = .20$. Mean age for the overall sample was 27.13 with a standard deviation of 11.01. Mean duration of having a driving license was 7.82 ($SD = 10.16$) for males and 5.79 ($SD = 7.54$) for females, while the mean for the overall sample was 6.67 with a standard deviation of 8.80. Independent samples t-test results showed that mean duration of driving license possession did not significantly differ between males and females, $t(160) = 1.45, p = .14$. When asked how fast in km/h participants drive in inter-urban and urban roads, male participants reported a mean of 110.51 ($SD = 18.72$) and 63.54 ($SD = 16.57$), while female participants reported a mean of 95.78 ($SD = 29.13$) and 63.18 ($SD = 18.49$). Mean speed of male and female participants did not differ in urban roads ($t(160) = .13, p = .89$), whereas male participants would drive significantly faster in inter-urban roads ($t(160) = 3.72, p = .000$). When asked if the participants were actively driving, all male participants reported actively driving a vehicle in the traffic, while 21.7% of female participants reported not actively driving. When asked how many road accidents participants have had for the last three years, 55.6% of participants reported zero accidents, 23.5% of participants reported having a single accident, 14.2% of participants reported having two accidents, and 6.8% of participants reported having three or more accidents. While 52.9% of male participants reported zero accidents, 22.9% reported having a single accident, 14.3% reported having two accidents, and 10% reported having three or more accidents, 57.6% of female participants reported zero accidents, 23.9% reported having a single

accident, 14.1% reported having two accidents, and 4.4% reported having three or more accidents in the last three years.

Table 1. Descriptive Statistics of Demographics Questionnaire of Male Participants

| Male Participants | N | Mean | SD | Min | Max | Percent |
|-----------------------------------------------------------------------------------|----|--------|-------|-----|-----|---------|
| Age | 70 | 28.40 | 12.34 | 18 | 60 | - |
| How long have you had a driver's license? (year) | 70 | 7.82 | 10.16 | 0 | 35 | - |
| What is your average speed in urban roads? | 70 | 63.54 | 16.57 | 30 | 70 | - |
| What is your average speed in inter-urban roads? | 70 | 110.51 | 18.72 | 70 | 170 | - |
| How many road accidents have you experienced for the last three years? | 70 | - | - | - | - | 100 |
| 0 | 37 | - | - | - | - | 52.9 |
| 1 | 16 | - | - | - | - | 22.9 |
| 2 | 10 | - | - | - | - | 14.3 |
| 3+ | 7 | - | - | - | - | 10 |
| How many times have you received a fine for speeding for the last three years? | 70 | - | - | - | - | 100 |
| 0 | 55 | - | - | - | - | 78.6 |
| 1 | 10 | - | - | - | - | 14.3 |
| 2 | 2 | - | - | - | - | 2.9 |
| 3+ | 3 | - | - | - | - | 4.3 |

Even though male participants reported more accident involvement, there were no significant differences in the mean number of accidents male ($M = .82$, $SD = 1.06$) and female ($M = .71$, $SD = 1.21$) participants reported, $t(160) = .60$, $p = .54$. Finally, participants were asked how many times they have received a fine for various violations for the last three years. For speeding, 78.6% of males and 89.1% of females reported zero tickets, 14.3% of males and 4.3% of females reported a single ticket, 2.9% of males and 4.3% of females reported two tickets, 4.3% of males and 2.2% of females reported three or more tickets. The number of fines received by male and female participants did not differ significantly. Further details on demographic information are presented in Table 1 and Table 2.

3.2. Rosenberg Self-Esteem Scale

Mean value of RSES score was 32.30 ($SD = 5.73$) for male participants and ranged from 11.00 to 40.00; and 30.19 ($SD = 5.81$) for female participants and ranged from 14.00 to 40.00. Overall mean score for the sample was 31.10 ($SD = 5.85$). An independent samples t-test was run and a statistically significant difference between mean self-esteem scores of male and female participants was found, $t(160) = 2.29$, $p = .02$. Therefore, the effect of self-esteem was controlled in the subsequent analyses.

Table 2. Descriptive Statistics of Demographics Questionnaire of Female Participants

| Male Participants | N | Mean | SD | Min | Max | Percent |
|-----------------------------------------------------------------------------------|----|-------|-------|-----|-----|---------|
| Age | 92 | 26.17 | 9.85 | 18 | 54 | - |
| How long have you had a driver's license? (year) | 92 | 5.79 | 7.54 | 0 | 28 | - |
| What is your average speed in urban roads? | 92 | 63.18 | 18.49 | 0 | 100 | - |
| What is your average speed in inter-urban roads? | 92 | 95.78 | 29.13 | 0 | 150 | - |
| How many road accidents have you experienced for the last three years? | 92 | - | - | - | - | 100 |
| 0 | 53 | - | - | - | - | 57.6 |
| 1 | 22 | - | - | - | - | 23.9 |
| 2 | 13 | - | - | - | - | 14.1 |
| 3+ | 4 | - | - | - | - | 4.4 |
| How many times have you received a fine for speeding for the last three years? | 92 | - | - | - | - | 100 |
| 0 | 82 | - | - | - | - | 89.1 |
| 1 | 4 | - | - | - | - | 4.3 |
| 2 | 4 | - | - | - | - | 4.3 |
| 3+ | 2 | - | - | - | - | 2.2 |

3.3. Traffic Locus of Control Scale

For the male participants, mean scores for the dimensions others, self, vehicle and environment, and fate was 3.97 ($SD = .60$), 3.19 ($SD = 1.04$), 3.25 ($SD = .74$), and 2.09 ($SD = .86$), and 4.01 ($SD = .48$), 3.30 ($SD = .86$), 3.60 ($SD = .68$), and 2.07 ($SD = .80$) for female participants. A series of independent samples t-tests were run to see whether there were statistically significant differences between male and female participants in the dimensions of T-LOC. There were no statistically significant difference between male and female participants in dimensions of others ($t(160) = -.39, p = .69$) self ($t(160) = -.70, p = .48$), and fate ($t(160) = .52, p = .91$). On the other hand, female participants attributed accidents to vehicle and environment significantly more than male participants ($t(160) = -3.16, p = .002$). The effect of locus of control was controlled in the subsequent analyses.

3.4. Effect of Participants' Sex in Evaluating Male and Female Drivers in DSI and DBQ

In order to demonstrate whether there is a significant difference in how male and female participants evaluate male and female drivers in perceptual-motor skills and safety skills dimensions of DSI, and errors, lapses, aggressive violations, and ordinary violations dimensions of DBQ, a MANCOVA analysis was run. The effects of self-esteem and locus of control were statistically controlled. Significant differences found in how female drivers were evaluated by male and female participants in perceptual-motor skills ($F(1, 155) = 14.57, p = .000, n^2=.08$), and safety skills ($F(1,155) = 15.95, p = .000, n^2=.09$) dimensions of DSI (See Table 3), and errors dimension ($F(1, 155) = 14.76, p = .000, n^2=.08$) of DBQ (See Table 4). In particular,

female participants ($M = 3.16$, $SD = .53$) rated perceptual-motor skills of female drivers higher than male participants ($M = 2.82$, $SD = .58$) rated female drivers. Similarly, female participants ($M = 3.78$, $SD = .42$) rated safety skills of female drivers higher than male participants ($M = 3.47$, $SD = .48$) did. In contrast, male participants ($M = 2.84$, $SD = .71$) rated female drivers higher in errors as compared to female participants ($M = 2.43$, $SD = .69$). No significant differences in how female drivers are evaluated in lapses, aggressive violations, and ordinary violations; and how male drivers are evaluated by male and female participants in any of the dimensions of DBQ or DSI were found.

Table 3. Mean and Standard Deviation Values for Dependent Variables in Male and Female Versions of DSI across Groups (Participant sex)

| Dependent Variable | Male Participants ($n = 70$) | | Female Participants ($n = 92$) | | Error | df | F | p | η^2 |
|---------------------------------------------|-----------------------------------|-----|-------------------------------------|-----|-------|------|--------|------|----------|
| | M | SD | M | SD | | | | | |
| Perceptual-motor skills (Female Drivers) | 2.82 | .58 | 3.16 | .53 | 155 | 1 | 14.57* | .000 | .086 |
| Safety Skills (Female Drivers) | 3.47 | .48 | 3.78 | .42 | 155 | 1 | 15.95* | .000 | .093 |
| Perceptual-motor skills (Male Drivers) | 3.68 | .45 | 3.75 | .42 | 155 | 1 | .79 | .37 | .005 |
| Safety Skills (Male Drivers) | 2.81 | .46 | 2.76 | .53 | 155 | 1 | .02 | .88 | .000 |

* Statistically significant at $p < .001$ level

4. Discussion

The distribution of sex in groups and the mean ages of the groups were similar. It was important to keep the number of male and female participants and the mean age of the groups in balance as the main aim of the study was to examine the differences between the two sexes. There were also no significant differences between male and female drivers in the duration of driver's license possession, which was important since driving experience was found to be influential in driving evaluations of the self (Lajunen & Summala, 1995). Even though male participants reported more involvement in accidents, the groups did not significantly differ. This was not expected, as the TSI statistics clearly demonstrated a significant gap between male and female drivers in accident involvement. However, self-report measures might be subject to under-reporting or bias, which might explain the lack of a significant difference between male and female participants in number of accidents reported. The average speed of male participants in inter-urban roads was significantly higher than females, which might indicate a riskier driving preference. An interesting result was that while all the male participants reported actively driving, 21.7% of the female drivers reported not actively driving, even though they had a driver's licence. As reported in Granié and Papafava (2011), female drivers are associated with poorer driving skills, and these stereotypical views were present even in the participants that are at the age of adolescence. Steele and Aronson (1995) reported that negative stereotypical views might have an everlasting effect on the stereotyped group, and continue to hinder their performance on the stereotyped domain.

Table 4. Mean and Standard Deviation Values for Dependent Variables in Male and Female Versions of DBQ across Groups (Participant sex)

| Dependent Variable | Male Participants (n = 70) | | Female Participants (n = 92) | | Error | df | F | p | η^2 |
|----------------------------------------|-------------------------------|------|---------------------------------|------|-------|----|--------|------|----------|
| | M | SD | M | SD | | | | | |
| Lapses (Female Drivers) | 2.73 | .65 | 2.75 | .77 | 155 | 1 | .000 | .98 | .000 |
| Errors (Female Drivers) | 2.84 | .71 | 2.43 | .69 | 155 | 1 | 14.76* | .000 | .087 |
| Aggressive Violations (Female Drivers) | 2.03 | .83 | 2.18 | .89 | 155 | 1 | 1.28 | .26 | .008 |
| Ordinary Violations (Female Drivers) | 2.23 | .65 | 2.20 | .68 | 155 | 1 | .27 | .60 | .002 |
| Lapses (Male Drivers) | 2.40 | .64 | 2.56 | .65 | 155 | 1 | 1.13 | .28 | .007 |
| Errors (Male Drivers) | 2.99 | .82 | 3.07 | .87 | 155 | 1 | .07 | .78 | .001 |
| Aggressive Violations (Male Drivers) | 4.27 | 1.20 | 4.46 | 1.06 | 155 | 1 | .26 | .60 | .002 |
| Ordinary Violations (Male Drivers) | 3.86 | 1.08 | 3.93 | .94 | 155 | 1 | .01 | .90 | .000 |

* Statistically significant at $p < .001$ level

The average self-esteem scores of the male drivers were also significantly higher than the average self-esteem scores of the female drivers participated in the current study. As research demonstrated, female drivers also experience significantly more driving anxiety compared to male drivers (Taylor, Alpass, Stephens & Towers, 2011). Thus, it was assumed that the reason why female drivers might be refraining from driving could be an effect of female driver stereotype, and its possible impact on self-esteem, driving anxiety, and driving abilities of female drivers. On the other hand, the self-esteem measurement that was taken in the current study was measuring general self-esteem. Therefore, a driving related self-esteem measurement would have been more convenient to tell if self-esteem had an impact on female drivers refraining from driving. For the locus of control, only significant difference between male and female participants was found to be the vehicle and environment-related factors. Generally, females attributed accidents more to vehicle and environment as compared to males, which was in accord with the study of Holland, Geraghty, and Shah (2010), which reported that female drivers had more external locus of control compared to male drivers.

Significant differences between male and female participants were obtained in evaluations of some DSI and DBQ dimensions. The comparison of how male and female drivers evaluated driver skills of other male and female drivers demonstrated similar results to previous research. Similar to the results of Özkan and Lajunen (2006) and Lajunen et al., (1998) in which being male was positively associated with perceptual-motor skills, both male and female participants endorsed male drivers for their perceptual-motor skills as compared to female drivers. However,

interestingly, while the mean scores of perceptual-motor skills the male drivers received from male and female participants did not significantly differ, the mean scores of perceptual-motor skills the female drivers received from male and female participants significantly differed from each other. In particular, male participants scored female drivers' perceptual-motor skills the lowest. However, even though the female participants scored female drivers' perceptual-motor skills lower than they scored male drivers', they scored female drivers' perceptual-motor skills significantly higher than male participants. Based on these findings, it was assumed that female drivers are seen significantly lower in perceptual-motor skills in driving by males than females, and it might be a factor that strengthens negative female driver stereotypes in Turkey. Furthermore, negative stereotypes towards female drivers' ability to drive might also be one of the reasons why female drivers might be refraining from driving even though they have a driving license, or score lower in self-esteem assesment. Results regarding safety skills of DSI also demonstrated similar findings to previous research. Özkan and Lajunen (2006) reported that femininity score, which was measured with Bem Sex Role Inventory, was related to safety skills. On the other hand, the study conducted by Özkan and Lajunen (2006) has not found an effect of being female in safety skills measures. The current study, differing from the Özkan and Lajunen (2006), did not measure self-evaluated driving skills, but rather asked male and female drivers to evaluate other male and female drivers. While there was no significant difference in how male drivers were evaluated by male and female participants in safety skills, there was a significant difference in how female drivers were evaluated by male and female participants. In particular, female participants evaluated other female drivers higher in safety skills as compared to male participants. The mean values of safety skills of female drivers was also assessed higher as compared to male drivers by both male and female participants. Therefore, the results further supported the fact that males are endorsed for their perceptual-motor skills and females for their safety skills, and sex was an effective factor in determining how other female drivers are evaluated in their perceptual-motor skills and safety skills by male and female drivers. To the authors' knowledge, the current study was the pioneer in demonstrating the significant difference in evaluations of other female drivers in their driving skills by male and female drivers, while this difference was absent in evaluating other male drivers' driving skills.

The mean scores of DBQ indicated findings similar to literature. Both male and female participants evaluated male drivers as higher in aggressive violations, ordinary violations, and errors. However, these evaluations did not differ significantly between male and female participants. Furthermore, female drivers were evaluated higher in lapses by both male and female participants; however, these evaluations did not differ significantly between male and female participants. On the other hand, female participants evaluated female drivers significantly lower in errors as compared to male participants' evaluations of female drivers. In general, the current study pointed out that sex-based significant differences do exist in how the female drivers are evaluated in their driving skills and behaviors by males and females but not how the male drivers are evaluated.

The current study was important in demonstrating how male and female drivers would evaluate other male and female drivers in driving skills and behaviors and demonstrating a possible effect of female driver stereotype on how other female drivers are evaluated while taking the effect of self-esteem and locus of control in account. On the other hand, there are several limitations about the current study and recommendations for future studies are made. Firstly, it was reported that stereotypical evaluations might be entwined in culture, and can resist to change (Moè, Cadinu, & Maass, 2015). The same study also reported that even though female drivers could drive successfully, they would evaluate their performance lower than they actually performed due to existing stereotypical beliefs about female drivers. The study of Moè, Cadinu,

and Maass (2015) was conducted in Italy, which was referred by the authors as a country with evident gender gap. As the authors cited, Italy was ranked 74th out of 135 countries in the 2011 global gender gap report (World Economic Forum, 2011), and ranked 63th out of 156 countries in the latest report of WEF in 2021 (World Economic Forum, 2021). Turkey, on the other hand, was ranked as 133th out of 156 countries in the global gender gap report of WEF in 2021 (World Economic Forum, 2021). Therefore, the results of the current study further support the notion that countries with pronounced gender gap would hold more negative and unfair beliefs towards female drivers. On the other hand, since both Italy and Turkey can be considered as countries with evident gender gap, replicating the study in countries with less evident gender gap is recommended to observe whether gender gap is a significant factor in how other female drivers would be evaluated by male and female participants. Secondly, while both the perceptual-motor skills and the safety skills dimensions of DSI were found to be significantly affected by the evaluators' sex when evaluating female drivers, only the errors dimension of DBQ was found to be affected by the evaluators' sex when evaluating female drivers. Although this might point out a difference in how the evaluators' sex would affect the evaluations of other female drivers when evaluating driver skills versus driving behavior, further studies are required to investigate the variables that might affect the evaluations of driver behaviors of other male and female drivers. One variable that might have been beneficial to include the study could be the gender roles. Previous research demonstrated some gender differences, apart from sex, in evaluations of driving behaviors and skills (Özkan & Lajunen, 2005a; Özkan & Lajunen, 2006; Öztürk, Fındık & Özkan, 2019). Including a gender roles inventory might have provided a better comparative value to the current study; however, the current study already required participants to participate in a relatively long study and fill forms of DBQ and DSI both for male and female drivers, and also RSES and T-LOC. Thus, adding another scale to measure gender roles would overcrowd the study and induce boredom and fatigue to the participants. Further research is required to see how gender roles might interact with how other male and female drivers are evaluated by male and female drivers. Thirdly, a limitation of the study was the age distribution of the sample. Since the participants were mostly university students, amongst the 162 participants, 77.8% were between ages 18 to 30, 21.6% were between ages 30 to 60, and only .6% were above the age of 60. Even though the groups did not significantly differ in mean age, replicating the study with a sample that consists of equally distributed groups of younger, middle-aged, and elderly participants can provide a better look in how age might affect the way other male and female drivers are evaluated in their driving skills and behavior depending on the participants' sex. In addition, replicating the study with such equally distributed age groups would make it possible to observe whether negative beliefs towards female drivers differ between participants of different age groups. Finally, using a driving-oriented self-esteem measurement rather than general self-esteem to further explore reasons behind female drivers' refrainment from driving is recommended.

Ethics Committee Approval Statement

Ethics committee approval of the study was obtained from Middle East Technical University Human Subjects Ethics Committee (Date 21/12/2020 and Application Number: 347-ODTU-2020).

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