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Driver social desirability scale: A Turkish adaptation and examination in the driving context

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ABSTRACT

Self-report data collection methods are widely used techniques to gather information in studies related to road safety. One of the most considerable limitations of self-reports is social desirability bias. One way to overcome the possible detrimental effects of socially desirable responding is to control it by using social desirability scales. With respect to that, the present study aims to adapt the Driver Social Desirability Scale into Turkish, examine its construct validity, and investigate the relationship between social desirability and driving-related measures. A total of 351 drivers between the ages of 19 and 59 completed a questionnaire including a demographic information form, the Driver Behavior Questionnaire (DBQ), the Driver Skill Inventory (DSI), the Two-Dimensional Social Desirability Scale (SDS), and the Driver Social Desirability Scale (DSDS). Factor analysis supported the two-factor structure of the DSDS in the Turkish sample. Social desirability correlated positively with age and driving experience. Female drivers reported higher levels of driver impression management, while male drivers scored higher on self-deception. Driver impression management was associated negatively with violations and perceptual-motor skills and positively with safety skills. Lastly, driver self-deception was positively related to violations, positive driver behaviors, perceptual-motor skills, and safety skills. The study shows that the Turkish version of the DSDS is a reliable and structurally valid instrument with incremental validity compared to the general social desirability measure in predicting driving-related outcomes.

1. Introduction

Self-report instruments have been widely used to gather information about driver behaviors, e.g., the Driver Behavior Questionnaire (DBQ; Reason et al., 1990), and driving skills, e.g., the Driver Skill Inventory (DSI; Lajunen & Summala, 1995) due to many advantages of technique such as low cost, time-saving, and easiness to collect a large amount of data (Lajunen & Özkan, 2011). Since driver behavior is conceptualized as drivers' preferred style (how a driver usually drives), drivers are considered to be aware of their behaviors. Thus, when asked to report these behaviors, drivers are expected to report the correct rate of their behavior. Driving skills,

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however, are conceptualized as a driver's maximum performance (what the driver can do), and therefore drivers may not be aware of their capabilities, such as their reaction times in case of emergency. Therefore, it can be said that "the DSI is not an objective measure of driver skills, but rather an instrument for investigating a driver's view of his or her skills" (Lajunen & Özkan, 2021) (p. 62).

Despite those advantages, self-report methods have a significant shortcoming, namely the social desirability bias. Social desirability bias has been defined as the tendency to give socially accepted and favorable answers (Paulhus, 1984; Paulhus & Reid, 1991). A variety of socially desirable responding (SDR) scales have been developed to control the SDR's potential effect on self-report instruments, such as the Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960). In MCSDS, responses are given as agreements to general moral statements, e.g., "I can remember playing sick to get out of something." Even though MCSDS was constructed to measure one-factor SDR, Helmes, Holden, and Ziegler (2015) reported that MCSDS's one-factor construct could demonstrate the extent to which people attempt to manage their impression in social environments. However, Pauls and Stemmler (2003) argued that SDR measured by MCSDS could also be due to people's unrealistic positive self-view rather than impression management. As a contribution to this debate, Paulhus (1984) proposed a two-factor model of social desirability bias. This model included self-deception, where respondents believed their overrated positive answers and responded honestly, and impression management, where respondents were aware of their positive answers given to impress others. The Balanced Inventory of Desirable Response (BIDR) was developed to examine the two-factor model (Paulhus & Reid, 1991). The unintentionally biased nature of self-deception was argued to be related to personality characteristics such as high self-esteem and ego enhancement. That is, the self-deception bias could be used unconsciously either to enhance their positive view for pleasure or to avoid threats to self-esteem (Lajunen & Özkan, 2011; Paulhus & Reid, 1991). On the other hand, impression management referred to the conscious attempt to cheat in responses to show a positive self-image to others (Paulhus & Reid, 1991). Accordingly, the public social settings might lead the respondents to give more biased answers than private social settings (Lajunen & Özkan, 2011; Paulhus & Reid, 1991). Impression management has been particularly seen as a severe problem in traffic behavior studies (Lajunen & Özkan, 2011). For example, drivers' reports on accident history, number of tickets, speeding behavior could be more prone to impression management (af Wåhlberg, 2010; af Wåhlberg, Dorn, & Kline, 2010; Lajunen et al., 1997).

As the most popular measurement, the DBQ's vulnerability to the SDR has been tested several times. Lajunen and Summala (2003) examined impression management bias in self-reported driving in different situations (public vs. private). The results showed a weak relationship between the DBQ items and impression management. However, af Wåhlberg (2010) argued that the findings might be applied to only differences between the situations because the study was based on a between-subject design; different respondents were included in different social situations. Later, Sullman and Taylor (2010) replicated the study with a within-subject design. In line with the findings of Lajunen and Summala (2003), the impression management bias was not found to be affecting the responses given to the DBQ items (Sullman & Taylor, 2010). Wickens et al. (2008) also argued that the DBQ is a biased-free instrument. However, af Wåhlberg (2010) noted that the lie scale for measuring social desirability (i.e., BIDR) in these studies was not driving specific, which might have influenced the results. According to af Wåhlberg (2010), insignificant or small correlations were found because SDR included questions taken from daily life ("I sometimes tell lies if I have to") rather than from traffic.

The only SDR scale specific to traffic conditions is the Driver Social Desirability Scale (DSDS; Lajunen et al., 1997). It was constructed based on the two-factor model (i.e., self-deception and impression management) of Paulhus (1984), and the items were developed as traffic targeted. Lajunen et al. (1997) found that self-reported accidents correlated negatively with impression management (af Wåhlberg, 2010; af Wåhlberg et al., 2010). af Wåhlberg et al. (2010) found a mixed relationship between age and SDR. For example, age and SDR were negatively correlated among fleet drivers but positively correlated among young drivers and truck drivers. In addition, impression management was positively, but self-deception was negatively related to driving experience (af Wåhlberg et al., 2010). The researchers have claimed that impression management is more influenced by mileage than self-deception (Lajunen et al., 1997). It is possible that due to high mileage and exposure to different types of situations, experienced drivers are well aware of their driving style and have a less biased view of their driving than less experienced drivers. On the other hand, experienced drivers might have a stronger urge to lie about their driving styles than inexperienced drivers because an experienced driver is more aware of the risks related to risky driving styles. For gender differences, Ostapczuk et al. (2017) reported that females were more concerned in impressing others with their driver behaviors than males. However, gender differences were not found in self-deception bias (Barraclough et al., 2014; Ostapczuk et al., 2017).

af Wåhlberg (2010) conducted a comprehensive study including various driver behavior scales, such as the violation dimension of the DBQ and the DSDS factors. The scales were distributed three times to participants during their driver education and twice to randomly selected drivers. The violation scale of the DBQ correlated negatively with impression management among both groups. When controlled for impression management bias, the correlations between violations and the self-reported accident numbers fell nearly half. Also, as noted earlier (af Wåhlberg et al., 2010), the number of accidents correlated negatively with impression management. It seems that self-reported aberrant behaviors and accident rates are all susceptible to the SDR.

Moreover, Lajunen et al. (1997) investigated the relationships between self-reported driver skills and socially desirable responding in Australia and Finland. Impression management correlated positively with safety skills in both countries, negatively correlated with perceptual-motor skills in the Finnish sample. Self-deception correlated positively with perceptual-motor skills and safety skills in both countries. The strongest correlation was found between self-deception and perceptual-motor skills. Ostapczuk et al. (2017) found similar results in German samples and concluded that the DSI is liable to the social desirability bias. The strongest relationship was found between self-deception bias and perceptual-motor skills. These findings indicate that drivers might have an unrealistic view of their perceptual-motor skills since the DSDS self-deception scale measures driver overconfidence (Lajunen et al., 1997).

1.1. Aim of the study

The first aim of the study is to adapt the DSDS into the Turkish language and validate its two-factor structure. The second aim of the study is to investigate the relationship between the scales of the DSDS, the DBQ, and the DSI in a sample of Turkish drivers. The Turkish adaptation of the DSDS is expected to provide a valid and reliable instrument. Impression management is hypothesized to be negatively related to aggressive and ordinary violation factors of DBQ factors, whereas ordinary violations are hypothesized to be positively related to self-deception bias. It is also hypothesized that self-deception bias will be positively related to positive driver behaviors. In addition, it is hypothesized that impression management will be negatively related to perceptual-motor skills but positively with safety skills. Moreover, higher confidence in both perceptual-motor and safety skills is hypothesized to be related to higher self-deception bias.

2. Method

2.1. Participants

The study was conducted with 351 active drivers between the ages of 19 and 59 ($M = 25.02$, $SD = 7.46$) and the majority of them (79.8%) was comprised of young drivers 25 and below. The average lifetime kilometers driven was 39908.03 ($SD = 80556.35$); 47% of the participants were female ($N = 165$), and 53% were male ($N = 186$).

2.2. Measures

2.2.1. The Driver Social Desirability Scale (DSDS)

The Driver Social Desirability Scale was developed by Lajunen et al. (1997). The scale includes 12 items and two factors: driver impression management (DIM) and driver self-deception (DSD). The first factor (DIM) consists of 7 items, and the second factor consists of 5 items. The scale was translated into Turkish by three independent experts whose mother tongue is Turkish. Later, in a panel discussion, these experts reviewed each item and finalized the Turkish translation. The Turkish translation of the items was cross-checked with the original items by the first author of the DSDS development study, who also has a good command of Turkish. During the translation process, the content of one item was changed. The item, "I have never exceeded the speed limit or crossed a solid white line in the center of the road when overtaking," was translated as "I have never exceeded the speed limit" to clarify the meaning of the item and to avoid the double-barreled question. The item was loaded on the same factor as the original version. The rest of the items were translated as in the original form. The response scale of the DSDS is a 7-point Likert-type scale from "not true" (1) to "very true" (7). On the original scale, only first, fourth and seventh anchors were labeled as "not true, quite true, very true". Unlike the original scale, remained anchors were also entitled as "rarely true, somewhat true, mostly true, almost always true," respectively. The Cronbach's Alpha levels of the factors are presented in the result section of the current study.

2.2.2. The Driver Behaviour Questionnaire (DBQ) and Positive Driver Behavior Scale (PDBS)

The Driver Behavior Questionnaire was developed by Reason et al. (1990) to measure aberrant driver behaviors. Sümer, Lajunen, and Özkan (2002) adapted the scale into Turkish. The scale consists of 28 items and four factors: aggressive violations, ordinary violations, errors, and lapses. The DBQ is a 6-point Likert-type scale from "never" (0) to "always" (5). As an addition to the DBQ, Özkan & Lajunen, 2005 developed the Positive Driver Behavior Scale, which aims to measure positive driver behaviors. The scale was evaluated with the same 6-point Likert-type scale as the DBQ. Including 14 items of the Positive Driver Behavior Scale to the DBQ, a total form with 42 items was used in the present study. Higher scores in a given factor represent a higher frequency of the related behaviors. In the present study, the internal consistency reliabilities of the factors were found as 0.75 for lapses, 0.86 for errors, 0.68 for aggressive violations, 0.86 for ordinary violations, and 0.89 for positive driver behaviors.

2.2.3. The Driver Skill Inventory (DSI)

The Driver Skill Inventory was developed to measure drivers' self-assessments of their driving skills (Lajunen & Summala, 1995). The DSI is based on a 5-point Likert-type scale measuring respondents' view of their skills ranging from 'very weak' (1) to 'very strong' (5). The DSI contains 20 items representing two sub-scales measuring perceptual-motor skills and safety skills. Perceptual-motor skills refer to vehicle handling skills (e.g., "performance in a critical situation," "fluent lane-changing in heavy traffic") and safety skills to the ability to control one's urges (e.g., "staying calm in irritating situations," "avoiding unnecessary risks"). Hence, safety skills measure "safety orientation" (Lajunen & Summala, 1995). The scale was adapted into Turkish by Lajunen and Özkan (2004). In the present study, the reliability coefficients (Cronbach's alpha) were 0.88 and 0.79 for the perceptual-motor skill scale and safety skill scale, respectively.

2.2.4. The Two-dimensional Social Desirability Scale (SDS)

The two-Dimensional Social Desirability Scale developed by Akın (2010) was used to measure the participants' social desirability scores. The SDS consists of 29 items and two factors: self-deception (SD) and impression management (IM). Higher scores represent higher levels of social desirability. The respondents evaluate the appropriateness of the 29 statements with a 5-point Likert-type scale ranging from "not appropriate" (0) to "totally appropriate" (4). The self-deception scale consists of 13 items (Cronbach's Alpha = 0.81) and the impression management scale includes 16 items (Cronbach's Alpha = 0.85).

2.2.5. Demographic information form

In this form, participants were asked to indicate their demographic information such as age, sex, and driving-related information such as total kilometers, last year's kilometers, licensing year, accident involvement, and the total number of offenses.

2.3. Procedure

After receiving an ethical approval form from the Middle East Technical University Ethics Committee (2016-SOS-074), a survey link was distributed to participants through social media channels. Besides, the survey link also was uploaded to the research management system of the Department of Psychology, Middle East Technical University. The students who participated in the study through this system earned bonus points in the courses by generating an anonymous id for each participant. The informed consent form was presented to all participants. Lastly, the data collection process was completely anonymous and confidential.

2.4. Analyses

A total of 351 responses was collected for the study. In line with the aim, exploratory factor analysis was conducted to examine the factorial structure of the DSDS in Turkey by following the suggestions of Ledesma et al. (2021). The skewness values of the items ranged between −0.78 and 0.29, indicating an acceptable range (Field, 2013). After that, descriptive statistics and bivariate correlations were computed. Independent samples *t*-test analyses were conducted to investigate the sex differences among variables. Lastly, seven hierarchical regression analyses were performed by entering the dimensions of the driver behaviors (i.e., lapses, errors, aggressive violations, ordinary violations, positive driver behaviors) and driving skills (i.e., perceptual-motor skills, safety skills) in the model separately as the dependent variable. Age, gender, and the previous year's kilometers were entered in the first step as control variables. In the second step, impression management and self-deception were entered, and then driver impression management and driver self-deception were entered in the model as the last step. Analyses were conducted using SPSS v.24.

3. Results

3.1. Item-level descriptive and factor analyses of the driver social desirability scale

A factor analysis on the DSDS was conducted using principal axis factoring. For the rotation, Direct Oblimin with Kaiser Normalization was used. The Kaiser-Meyer-Olkin measure of sampling adequacy was as 0.849, and Bartlett's Test of Sphericity was significant ($df = 66$, $p < .001$), showing that the correlation matrix from the items of the scale is factorable. The number of factors was decided based on the Kaiser criterion of eigenvalues over 1.0, the Cattell scree plot test, and parallel analysis. All three methods resulted in a two-factor solution.

The first factor can be labeled as "driver impression management," consisting of seven items with 0.88 Cronbach's alpha reliability. The factor explained 41.71% of the variance, and the initial eigenvalue of the dimension was 5.00. The communality values of the items ranged from 0.41 to 0.80. The second factor can be labeled as "driver self-deception," consisting of five items with 0.77 Cronbach's alpha reliability. The factor explained 18.17% of the variance, and the initial eigenvalue of the dimension was 2.18. The communality values of the items ranged from 0.09 to 0.85 (see Table 1 for mean and standard deviations with Pattern Matrix factor loading).

3.2. Correlations

Pearson bivariate correlation coefficients between variables and means and standard deviations of the study variables are presented

Table 1
Factor loadings and the communality values of the items of the Driver Social Desirability Scale with oblique rotation.

Items	*M* (*SD*)	Factors		Communality
		DIM	DSD	
Even if there were no police control, I would still obey speed limits.	*4.44* (*1.89*)	**0.93**	−0.10	0.80
I have never exceeded the speed limit.	*3.40* (*2.19*)	**0.82**	−0.13	0.62
I always obey traffic rules, even if I'm unlikely to be caught.	*4.84* (*1.76*)	**0.79**	0.02	0.64
I have never driven through a traffic light when it has just been turning red.	*3.84* (*1.97*)	**0.66**	0.03	0.45
I have never wanted to drive very fast.	*3.86* (*2.01*)	**0.66**	0.04	0.46
I have never overtaken in places where overtaking is prohibited.	*4.66* (*1.92*)	**0.61**	0.08	0.41
I always keep a sufficient distance from the car in front of my car.	*5.28* (*1.50*)	**0.51**	0.35	0.52
I always know what to do in traffic situations.	*4.97* (*1.35*)	−0.10	**0.95**	0.85
I am always sure how to act in traffic situations.	*5.31* (*1.26*)	−0.03	**0.78**	0.59
I never regret my decisions in traffic.	*4.39* (*1.61*)	0.12	**0.63**	0.46
I always remain calm and rational in traffic.	*4.70* (*1.49*)	0.18	**0.62**	0.50
I don't care what other drivers think of me.	*3.87* (*1.83*)	−0.04	**0.32**	0.09

Note. DIM: Driver impression management, DSD: Driver self-deception. Bold indicates factor loadings in the relevant factor.

Table 2
Bivariate correlations between study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. *Age*															
2. *License year*	0.95***														
3. *Previous year km*	0.18**	0.20***													
4. *Lifetime km*	0.58***	0.57***	0.60***												
5. *Driver impression management*	0.01	−0.03	−0.25***	−0.10											
6. *Driver self-deception*	0.21***	0.20***	0.13*	0.23***	0.36***										
7. *Lapses*	−0.12*	−0.11*	−0.02	−0.12*	−0.10	−0.22***									
8. *Errors*	−0.09	−0.07	0.04	−0.08	−0.23***	−0.22***	0.73***								
9. *Aggressive violations*	0.13*	0.16**	0.16**	0.16**	−0.40***	−0.07	0.29***	0.40***							
10. *Ordinary violations*	−0.06	−0.03	0.21***	0.03	−0.61***	−0.11*	0.48***	0.63***	0.54***						
11. *Positive behaviors*	0.09	0.06	0.04	0.05	0.19***	0.31***	−0.26***	−0.37***	−0.08	−0.20***					
12. *Perceptual-motor skills*	0.21***	0.24***	0.29***	0.30***	−0.19***	0.47***	−0.24***	−0.11*	0.23***	0.14**	0.25***				
13. *Safety skills*	0.09	0.07	−0.12*	0.00	0.53***	0.43***	−0.19***	−0.27***	−0.36***	−0.45***	0.37***	0.30***			
14. *Impression management*	0.19***	0.15**	−0.05	0.07	0.52***	0.39***	−0.22***	−0.26***	−0.24***	−0.38***	0.25***	0.18**	0.41***		
15. *Self-deception*	0.11*	0.09	0.04	0.11*	0.27***	0.53***	−0.26***	−0.21***	−0.14**	−0.18**	0.21***	0.39***	0.39***	0.57***	
M	25.02	5.56	7141.43	39908.03	4.33	4.65	1.89	1.61	2.32	2.04	4.37	3.79	3.71	3.46	3.38
SD	7.46	6.33	11245.74	80556.35	1.46	1.10	0.59	0.61	0.91	0.77	0.87	0.63	0.54	0.60	0.53

Note: Factor information; driver impression management and driver self-deception (DSDS), lapses, errors, aggressive violations and ordinary violations (DBQ), positive driver behaviors (PDBS), perceptual-motor skills and safety skills (DSI), impression management and self-deception (SDS), * $p < .05$; ** $p < .01$; *** $p < .001$.

in Table 2. Age correlated positively with license year, kilometers driven in the previous year, lifetime kilometers, driver self-deception, aggressive violations, perceptual-motor skills, impression management, and self-deception but negatively with lapses. Drivers' licensing year was positively correlated with kilometers driven in the previous year, lifetime kilometers, driver self-deception, aggressive violations, perceptual-motor skills, and impression management, and negatively with lapses. Kilometers driven in the previous year correlated positively with lifetime kilometers, aggressive violations, ordinary violations, driver self-deception, and perceptual-motor skills, and negatively with driver impression management and safety skills. Lifetime kilometers was positively correlated with driver self-deception, aggressive violations, perceptual-motor skills, and self-deception, and negatively with lapses.

Driver impression management positively correlated with driver self-deception, positive behaviors, safety skills, impression management, self-deception, and negatively with errors, aggressive violations, ordinary violation, and perceptual-motor skills. Driver self-deception correlated positively with positive behaviors, perceptual-motor skills, safety skills, impression management, self-deception, and negatively with lapses, errors, and ordinary violations. Dimensions of aberrant driver behaviors correlated positively with each other and negatively with safety skills, impression management, and self-deception. Positive behaviors correlated positively with perceptual-motor skills, safety skills, impression management, and self-deception. Besides, perceptual-motor skills correlated positively with aggressive violations, ordinary violations, positive behaviors, safety skills, impression management, self-deception, and negatively correlated with lapses and errors. Safety skills correlated positively with impression management and self-deception. Finally, impression management positively correlated with self-deception.

3.3. Sex differences between variables

The independent samples *t*-test analyses were conducted to investigate the sex differences among variables (see Table 3) showed that males reported more ordinary violations and perceptual-motor skills and less driver impression management with medium effect sizes. Males also showed more errors, aggressive violations, and self-deception, but the effects were rather small.

3.4. Relations between social desirability and driving outcomes

In order to examine the unique contribution of driving specific social desirability and the effects of general social desirability on driver behaviors and driving skills, seven hierarchical regression analyses were conducted (see Table 4). In regression analyses, age, sex, and the previous year's kilometers were entered as control variables in the first step. In the second step, two dimensions of general social desirability (i.e., self-deception and impression management) were entered into the model. In the third step, after controlling the effects of demographic variables and general social desirability, two dimensions of driving specific social desirability (i.e., driver impression management and driver self-deception) were entered in the model. Finally, the dimensions of driver behaviors (i.e., lapses, errors, aggressive violations, ordinary violations, and positive driver behaviors) and driving skills (i.e., perceptual-motor skills and safety skills) were separately entered as the dependent variable.

The model was significant for lapses ($F(7, 341) = 4.91, p < .001$). Self-deception (95% CI [−0.35, −0.07]) was negatively related to lapses. Drivers with higher self-deception scores reported fewer lapses than drivers with lower self-deception.

The model was significant for errors ($F(7, 341) = 5.45, p < .001$). Impression management (95% CI [−0.30, −0.04]) was negatively related to errors. Drivers with higher impression management scores reported fewer errors than drivers with lower impression management.

The model was significant for aggressive violations ($F(7, 341) = 11.53, p < .001$). Impression management (95% CI [−0.54, −0.16]) and driver impression management (95% CI [−0.30, −0.15]) were negatively related to aggressive violations. Drivers with less general and driver impression management reported higher aggressive violations than those with higher general and driver impression management.

Table 3
Sex differences among study variables.

Variable	Female ($N = 165$)		Male ($N = 186$)		$t(349)$	p	*Cohen's d*
	M	*SD*	*M*	*SD*			
Driver impression management	4.76	1.46	3.96	1.36	5.33	<0.001	0.57
Driver self-deception	4.58	1.12	4.71	1.08	−1.08	0.281	0.12
Lapses	1.93	0.57	1.85	0.60	1.24	0.217	0.14
Errors	1.54	0.52	1.68	0.68	−2.13	0.034	0.23
Aggressive violations	2.17	0.90	2.46	0.90	−2.99	0.003	0.32
Ordinary violations	1.81	0.65	2.23	0.82	−5.36	<0.001	0.57
Positive driver behaviors	4.43	0.91	4.32	0.84	1.10	0.270	0.13
Perceptual-motor skills	3.63	0.64	3.94	0.59	−4.65	<0.001	0.50
Safety skills	3.76	0.54	3.66	0.54	1.74	0.083	0.19
Impression management	3.52	0.63	3.42	0.57	1.53	0.128	0.17
Self-deception	3.32	0.54	3.43	0.53	−1.95	0.052	0.21

Note: Factor information; driver impression management and driver self-deception (DSDS), lapses, errors, aggressive violations and ordinary violations (DBQ), positive driver behaviors (PDBS), perceptual-motor skills and safety skills (DSI), impression management and self-deception (SDS). *df* = 343 for errors, 345 for ordinary violations and 349 for other variables.

Table 4
Relations between Social Desirability and Driving Outcomes.

	Lapses						Errors						Aggressive Violations						Ordinary Violations					
	R^2	$R^2\Delta$	*df*	$F\,\Delta$	β	*p*	R^2	$R^2\,\Delta$	*df*	$F\,\Delta$	β	*p*	R^2	$R^2\,\Delta$	*df*	$F\,\Delta$	β	*p*	R^2	$R^2\,\Delta$	*df*	$F\,\Delta$	β	*p*
1st Step	0.02	0.02	3, 345	2.38		0.070	0.02	0.02	3, 345	2.53		0.057	0.05	0.05	3, 345	6.28		<0.001	0.11	0.11	3, 345	13.77		<0.001
Age					−0.13	0.022					−0.10	0.070					0.10	0.062					−0.10	0.058
Sex					−0.07	0.189					0.10	0.058					0.13	0.017					0.24	<0.001
Last year km					0.01	0.850					0.04	0.487					0.12	0.023					0.18	0.001
2nd Step	0.09	0.07	2, 343	12.44		<0.001	0.08	0.06	2, 343	11.79		<0.001	0.12	0.07	2, 343	12.68		<0.001	0.22	0.12	2, 343	25.89		<0.001
Impression management					−0.10	0.125					−0.17	0.010					−0.23	<0.001					−0.35	<0.001
Self-deception					−0.19	0.003					−0.12	0.062					−0.05	0.476					−0.01	0.894
3rd Step	0.09	0.00	2, 341	0.94		0.391	0.10	0.02	2, 341	3.08		0.047	0.19	0.07	2, 341	15.67		<0.001	0.41	0.19	2, 341	54.86		<0.001
Driver impression management					0.02	0.780					−0.08	0.219					−0.36	<0.001					−0.57	<0.001
Driver self-deception					−0.09	0.173					−0.11	0.096					0.10	0.114					0.18	0.001

	Positive Driver Behaviors						Perceptual-Motor Skills						Safety Skills					
	R^2	$R^2\,\Delta$	*df*	$F\,\Delta$	β	*p*	R^2	$R^2\,\Delta$	*df*	$F\,\Delta$	β	*p*	R^2	$R^2\,\Delta$	*df*	$F\,\Delta$	β	*p*
1st Step	0.01	0.01	3, 345	1.63		0.181	0.15	0.15	3, 345	19.59		<0.001	0.04	0.04	3, 345	4.13		0.007
Age					0.08	0.133					0.16	0.001					0.11	0.036
Sex					−0.08	0.152					0.19	<0.001					−0.09	0.090
Last year km					0.04	0.505					0.23	<0.001					−0.12	0.027
2nd Step	0.08	0.07	2, 343	12.27		<0.001	0.27	0.12	2, 343	28.95		<0.001	0.24	0.21	2, 343	46.54		<0.001
Impression management					0.19	0.003					−0.02	0.716					0.26	<0.001
Self-deception					0.10	0.121					0.37	<0.001					0.26	<0.001
3rd Step	0.13	0.05	2, 341	9.02		<0.001	0.44	0.17	2, 341	51.96		<0.001	0.43	0.19	2, 341	55.47		<0.001
Driver impression management					0.04	0.564					−0.39	<0.001					0.44	<0.001
Driver self-deception					0.25	<0.001					0.47	<0.001					0.19	<0.001

Note: Factor information; driver impression management and driver self-deception (DSDS), lapses, errors, aggressive violations and ordinary violations (DBQ), positive driver behaviors (PDBS), perceptual-motor skills and safety skills (DSI), impression management and self-deception (SDS).

The model was significant for ordinary violations ($F(7, 341) = 34.26$, $p < .001$). Driver self-deception (95% CI [0.05, 0.20]) was positively and impression management (95% CI [−0.59, −0.29]) and driver impression management (95% CI [−0.36, −0.25]) were negatively associated with ordinary violations. Drivers with higher self-deception and less general and driver impression management reported higher ordinary violations than those with lower self-deception and higher general and driver impression management.

The model was significant for positive driver behaviors ($F(7, 341) = 7.03$, $p < .001$). Impression management (95% CI [0.09, 0.45]) and driver self-deception (95% CI [0.09, 0.29]) were positively associated with positive behaviors. Drivers with higher general and driver impression management showed higher levels of positive behaviors than those with less general and driver impression management.

The model was significant for perceptual-motor skills ($F(7, 341) = 38.23$, $p < .001$). Self-deception (95% CI [0.29, 0.55]) and driver self-deception (95% CI [0.20, 0.32]) were positively and driver impression management (95% CI [−0.21, −0.12]) was negatively related to perceptual-motor skills. Drivers with higher general and driver self-deception and less driver impression management reported more perceptual-motor skills than drivers with less general and driver self-deception and higher driver impression management.

The model was significant for safety skills ($F(7, 341) = 36.31$, $p < .001$). Impression management (95% CI [0.13, 0.33]), self-deception (95% CI [0.14, 0.36]), driver impression management (95% CI [0.12, 0.20]) and driver self-deception (95% CI [0.04, 0.14]) were positively associated with safety skills. Drivers with higher general and driving specific social desirability reported higher safety skills than drivers with less general and driving specific social desirability.

Overall, the results showed that general social desirability was significantly associated with all forms of driver behaviors and skills. Moreover, driving specific social desirability contributed significantly to the model in all driver behaviors and skills except for lapses. Total variance explained by the overall model ranged between 9% and 44%. Drivers with higher driving specific impression management reported less aggressive violations, ordinary violations, perceptual-motor skills, and higher safety skills. Besides, drivers with higher driving specific self-deception revealed higher ordinary violations, positive driver behaviors, perceptual-motor skills, and safety skills.

4. Discussion

The present study adapted the Driver Social Desirability Scale into Turkish and investigated its relationship with a general social desirability scale, driver behavior, driving skill, and demographic variables. The original factor structure of the 12-item DSDS (Lajunen et al., 1997) with driver impression management scale with seven items and driver self-deception scale with five items was obtained in the Turkish sample. Also, the scales had good internal consistency reliabilities showing that the Turkish version of the DSDS is a reliable instrument. The two factors of the DSDS correlated moderately with each other. Additionally, the convergent correlations between general and driving specific impression management and self-deception were high, which indicates the high construct validity of the DSDS. On the other hand, the discriminant correlation between driver impression management and self-deception was small, while the driver's self-deception and impression management had a moderate intercorrelation.

According to the results, there were significant correlations between demographic variables and social desirability. For example, drivers had a higher tendency to respond in a socially desirable manner (i.e., DSD, IM, and SD) with increased age. In line with previous research, the concern for presenting favorable and positively biased self-descriptions to others increased with age (Barraclough et al., 2014). Moreover, the current study demonstrated that driving experience (i.e., kilometers driven in the previous year, lifetime kilometers, and license year) correlated positively with driver self-deception and negatively with driver impression management. Contrary to nonsignificant relations between experience and the DSDS in previous studies (Barraclough et al., 2014; Lajunen et al., 1997), experienced drivers were inclined to show more positively biased yet subjectively honest responses and less impression management. Similarly, Lajunen and Summala (1995) showed that experienced drivers rated themselves more skilled than inexperienced drivers.

Moreover, in terms of general socially desirable responding tendency, males were more inclined to self-deception than females, indicating that males hold a more unrealistic view of themselves, i.e., overconfidence in their capabilities. McKenna et al. (1991) showed that an overestimation of driving skills compared to an average driver was more prevalent among male drivers. Regarding driving specific social desirability, consistent with the previous study (Ostapczuk et al., 2017), female drivers showed more driver impression management than male drivers, whereas no difference was observed for driver self-deception. In other words, drivers' conscious attempt to present themselves as law-abiding and as rule-oriented drivers all the time (Lajunen et al., 1997) was observed in females more than males. High impression management scores can be interpreted as the need for social approval (Crowne & Marlowe, 1960; Lajunen et al., 1998; Paulhus, 1984). In that sense, the need for social approval may be more salient for females than males. Similarly, Chung and Monroe (2003) also suggested that females are more likely to be affected by societal norms and values.

As hypothesized, driving specific social desirability was significantly associated with aberrant driver behaviors after controlling for the demographic variables and general social desirability. Accordingly, consistent with the literature (af Wåhlberg, 2010), drivers who were more vulnerable to driver impression management (i.e., deliberately attempting to show a favorable self-image to others) displayed fewer aggressive violations and ordinary violations. Additionally, drivers who were overconfident in their ability to make rational and correct decisions while driving -i.e., driver self-deception- (Lajunen et al., 1997) reported more ordinary violations. In other words, drivers presented themselves as more rule-obedient and safe drivers to impress others while they justified their ordinary violations by honestly believing their overrated abilities.

Positive driver behaviors were found to be prone to social desirability, as hypothesized. It was found that participants who had a positively biased self-view of themselves (i.e., driver self-deception) were likely to report more frequent positive driver behaviors. There is an effect of driving specific social desirability for the intentionally performed driver behaviors such as aggressive violations,

ordinary violations, and positive driver behaviors (Özkan, 2006). However, such effect was not observed for the unintentional driver behaviors such as lapses and errors. After controlling for demographic variables and general social desirability, driving specific social desirability predicted intentional driver behaviors but not unintentional driver behaviors. Intentional behaviors are influenced by social desirability because intentional behavior, by definition, always includes an active choice that can be influenced by deliberate socially desirable responding. Furthermore, concerning the strength of the relationships, stronger associations for the driver impression management and intentional aberrant behaviors (e.g., ordinary and aggressive violations) and between the driver self-deception and positive driver behaviors were observed. Accordingly, impression management seems to be more dominant for "driver not committing aberrant driving behaviors or violation-free driver" self-image. In contrast, self-deception seems to have a more dominant role for "driver engaging in positive driver behaviors or prosocial driver" self-image. Therefore, it may be argued that drivers try to convince others that they perform less aberrant behaviors and convince themselves that they perform more positive driver behaviors than they actually do.

Driver skills were also associated with driving specific social desirability. As hypothesized, drivers who are less concerned about impressing others and believe in their overrated abilities reported higher levels of perceptual-motor skills (Lajunen et al., 1998; Ostapczuk et al., 2017). On the other hand, drivers who were more susceptible to overrating their abilities (i.e., driver self-deception) and concerned for showing a positive self-image to others (i.e., driver impression management) reported higher safety skills. Altogether, these results suggest that drivers seem to have an unrealistic positive view of their driving skills, possibly distorting their risk perception and leading to risky driving (Lajunen et al., 1998). Also, consistent with Lajunen et al. (1998), intentionally presenting oneself as a driver holding safety skills (e.g., safety-oriented driver) and over-trusting own vehicle handling abilities (e.g., skill-oriented driver) seems to be the most favored form of driver social desirability in terms of driver skills. Additionally, Martinussen et al. (2017) found that young male drivers' perception of driving skills was inaccurate, especially for hazard perception and detection skills, suggesting that socially desirable responding also seems to be an important factor in driving skills. Future studies should consider this vulnerability of the driving skills to social desirability, explicitly focusing on self-reported assessment of driving skills.

Lajunen and Özkan (2011) mentioned that impression management is a severe problem in traffic studies that require a self-report of undesirable behaviors such as accidents as guilty part and traffic citations. Previous studies have shown that self-reported violations, number of accidents, and number of tickets are susceptible to impression management (af Wåhlberg, 2010; af Wåhlberg et al., 2010; Lajunen et al., 1997) and socially desirable responding (Barraclough et al., 2014), which is in line with the results of the current study regarding aberrant driver behaviors and driving skills. It means that social desirability tendency is likely to lead to under-reporting of aberrant behaviors (Lindeman & Verkasalo, 1995). The current study results showed further that the SDR tendency might relate to the over-reporting of positive behaviors. Although some studies suggested that driving self-report suffers from social desirability (af Wåhlberg, 2010; af Wåhlberg et al., 2010; Lajunen et al., 1997; Lajunen & Özkan, 2011), some other studies suggested a small effect of public–private manipulation for the DBQ or no effect (Poó et al., 2013), concluding that driving self-reports do not suffer from social desirability (Lajunen & Summala, 2003; Sullman & Taylor 2010). In the latter studies, private vs. public setting manipulation has been employed to observe the social desirability effect. In those studies, individual differences (Lajunen & Summala, 2003) and lack of control over providing similar terms for the private setting (Sullman & Taylor, 2010) might have biased the results. The current research employed self-administered and anonymous conditions, assumed to be the lowest level of bias. Thus, the present study's findings suggested that both driver behaviors, including aberrant and positive driver behaviors, and driving skills, were prone to social desirability bias. Nevertheless, it would be interesting to design a study employing the Turkish version of the DSDS with the public vs. private setting method, which would also contribute to the scale's validity.

It should also be noted that, unlike previous studies (Lajunen & Summala, 1995; Sullman & Taylor, 2010; Wickens et al., 2008), the general social desirability scale (i.e., SDS) is associated with all driver behavior and driver skill components. As suggested by af Wåhlberg (2010), the driving specific social desirability scale (i.e., DSDS) accounted for an additional amount of variance in driver behaviors (except for lapses) and driver skills beyond what the general SDR did. The DSDS accounted for a higher amount of unique variance in aggressive violations, ordinary violations, and perceptual-motor skills than the SDS did. These findings supported the incremental validity of the DSDS in explaining the driving-related outcomes. Similarly, the increased predictive power of industry-specific scales over general scales has been shown in the literature. For example, Huang et al. (2013) showed that incremental predictive validity of safety climate measure specific to the trucking industry was higher than the generic safety climate scale. Furthermore, Zohar (2010) suggested the development of level-specific subscales (levels in organizational hierarchy) in order to improve "measurement sensitivity and conceptual rigor" for measuring safety climate perceptions of employees. Likewise, Newnam and VonSchuckmann (2012) identified the Occupational Driver Behaviour Questionnaire as a more sensitive measure of the workplace context than the Driver Behaviour Questionnaire. Thus, in line with Lajunen et al. (1997), using driving-specific social desirability scales in traffic-related studies can be suggested for future studies.

In addition to assuring participants' anonymity and confidentiality (Özkan & Lajunen, 2021), self-administration instead of face-to-face administration and private instead of public administration of self-reports (e.g., Lajunen & Summala, 2003; Sullman & Taylor, 2010) might be preferred to handle social desirability. Moreover, using scales to statistically control for and partial out the potential effect of social desirability bias (i.e., af Wåhlberg, 2010; af Wåhlberg et al., 2010; Ostapczuk et al., 2017) may free the results from social desirability to a certain extent. Additionally, implicit measures may be utilized to handle social desirability bias or complement self-reports in driving studies (e.g., Tosi, Ledesma, Díaz Lázaro, & Poó, 2020). For example, Harré and Sibley (2007) used implicit measurements to test the self-enhancement biases of drivers. The implicit self-enhancement predicted drivers' explicit and implicit assessments on their ability and cautions. Thus, it was suggested that the drivers' self-enhancement biases on their ability were deeply rooted, and implicit measures could be used to capture. Also, it was argued that biases were stronger when measured implicitly, suggesting that explicit measures of self-enhancement biases could also inhibit these biases. Implicit measures were argued to bypass

any inhibitions. Few studies investigated the implicit measure of driver skills (Bıçaksız, Harma, Doğruyol, Lajunen, & Özkan, 2018; Öztürk, 2017). They showed evidence to measure driver skill implicitly. However, it is still unclear whether they inhibit any biases. It should also be highlighted that other measurement methods (such as implicit measurements) could be preferred to overcome the potential limitations due to the nature of self-reports. Following the previous studies using implicit measurement tools in traffic and transportation studies (Bıçaksız et al., 2018; Öztürk, 2017; Tosi, Haworth, Díaz-Lázaro, Poó, & Ledesma, 2021), driving specific social desirability could also be investigated by using implicit measurement methods in future studies.

Furthermore, some may argue whether the conditions presented in the DSDS items are possible for specific drivers, suggesting that the scale may not measure their social desirability. Lajunen et al. (1997) suggested that extremely inexperienced drivers who have never experienced these situations may not engage in impression management. It means that the answers of extremely inexperienced drivers to DIM items may reflect their actual driving behavior rather than giving positive answers to impress others. Lajunen et al. (1997) also suggested that if the driver is highly experienced (e.g., professional drivers), the driver self-deception factor might measure actual driving behavior instead of overconfidence. However, they supposed that for example, "almost every middle-experienced driver has exceeded or wanted to exceed the speed limit at least once during her/his driving history" (p. 351). In other words, the DIM items are supposed to be lies for the driver population with average driving experience, and DSD items should reflect overconfidence if the participants were not professionals, thus measuring social desirability for middle-experienced drivers. The current study comprised the middle-experienced driver population with average lifetime kilometers driven 39908.03 (SD = 80556.35), meaning that the sample was not composed of highly experienced or inexperienced drivers. Thus, the DSDS is believed to measure social desirability for the current study sample.

The study has a few limitations. Online surveys yield higher response rates than paper surveys (Sax et al., 2008); however, some biases exist. Since the data in the current study was collected online, the participants might be restricted to individuals who regularly use social media accounts. This situation may have caused the majority of the sample to be composed of young drivers. Since the study sample is mainly composed of young adults, the generalizability of the findings is somewhat limited. Therefore, Turkish DSDS is suggested to be studied with a diverse group of drivers, including older drivers. Moreover, it should be noted that the measurement of sex was binary in the current study. According to Cameron and Stinson (2019), the binary measures of sex and gender could endanger the generalizability of results due to the exclusion of participants who are defining themselves as other than "male" or "female". It should also be noted that "sex" and "gender" were translated with the same word in the Turkish language, which is "cinsiyet". Additionally, although it is a suggested practice (Putnick & Bornstein, 2016), the psychometric equivalence of the constructs has not been examined in the current study prior to the comparison between male and female drivers' mean scores in the study variables. Thus, it is suggested for future studies to examine measurement invariance or measurement equivalence of constructs.

Although the present study exhibited evidence of reliability and validity of the Turkish version of the DSDS, such as internal consistency reliability, construct validity (i.e., discriminant and convergent validity), and predictive validity, further research on the psychometric properties of the scale such as predictive validity with different variables could be suggested. Even though the factorial structure obtained in the present study showed a similar pattern with the original structure (Lajunen et al., 1997), one item ["I always keep a sufficient distance from the car in front of my car."] could potentially be interpreted as showing cross-loading. In this regard, the authors suggest that the item can be addressed in future studies. Another important remark is that during the translation process of the items, it was realized that one item implied double meaning in the original scale ["I have never exceeded the speed limit or crossed a solid white line in the center of the road when overtaking."]. Olson (2008) suggested different ways of dealing with double-barreled questions; identifying the constructs, deleting irrelevant constructs, and splitting the item into two or more statements. After consulting the developer of the DSDS, the item was translated as "I have never exceeded the speed limit." The intention was to clarify the meaning to obtain reliable answers and accurate results. Although the item was located on the same factor as the original item, changing the item content might have endangered the comparability of the Turkish version with the existing versions of the DSDS. For the future use of the DSDS, this problematic item should be approached with caution. Also, for validation purposes, different sources of data may be incorporated into future studies. It is suggested that in public situations (e.g., roadside surveys conducted by police), people are more likely to engage in impression management (Lajunen & Summala, 2003). Although each data source has its own advantages and disadvantages, collecting data through anonymous and self-administered methods such as self-reports, auto-tech-detect based self-report (ADT; Özkan & Lajunen, 2021), unobtrusive observations, or using official records compared to non-anonymous or face-to-face applications may be better alternatives to study the social desirability bias.

The current study has both empirical and methodological contributions to the literature. The relationship between driving specific social desirability and driver behavior factors (e.g., errors, positive driver behaviors) was studied for the first time. To our knowledge, predispositions to social desirability (either general or driving specific) for positive driver behaviors have never been studied in the literature before. In terms of the methodological contributions, the study shows that the Turkish version of the DSDS is a reliable and valid instrument for measuring socially desirable responding in drivers' self-reports. Furthermore, the current research provided evidence for the incremental validity of driving specific scale (e.g., the DSDS) compared to general scale (e.g., the SDS) in explaining traffic-related variables. The Turkish adaptation of the DSDS can be readily used in traffic behavior studies in Turkey.

5. Conclusion

In sum, the Turkish DSDS is found to be a psychometrically reliable and valid instrument. In the current study, the popular self-report measures of driving (i.e., the DBQ and the DSI) are found vulnerable to social desirability bias. For the first time in the literature, positive driver behaviors were studied in terms of social desirability and were found vulnerable to social desirability. Also, even after controlling for the demographic variables and general social desirability scale, the driving specific social desirability scale

accounts for a significant proportion of variance in intentional driver behaviors and driving skills, indicating its incremental validity. Thus, applied traffic research might benefit from the driving specific social desirability scale. The Turkish version of the DSDS is a valuable tool for traffic safety research in Turkey.

CRediT authorship contribution statement

Şerife Yılmaz: Conceptualization, Methodology, Writing – original draft, Investigation, Writing – review & editing, Project administration. **Burcu Arslan:** Conceptualization, Methodology, Writing – original draft, Investigation, Writing – review & editing. **İbrahim Öztürk:** Conceptualization, Methodology, Writing – original draft, Formal analysis, Writing – review & editing. **Özgün Özkan:** Conceptualization, Methodology, Writing – original draft, Investigation, Writing – review & editing. **Türker Özkan:** Conceptualization, Methodology, Writing – review & editing, Supervision. **Timo Lajunen:** Conceptualization, Methodology, Writing – review & editing, Supervision.

Declaration of Competing 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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