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Behavior

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Araştırma Makalesi

Yielding the Right of The Way: A Mixed Design Study for Understanding Drivers' Yielding Behavior

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Abstract

To understand drivers' yielding behavior, field observations and semi-structured interviews were conducted. Cramer's V and logistic regression analyses of the field observation on 1140 drivers and pedestrians demonstrated that driver gender and pedestrian age have significant relationships with the tendency to yield the right of way. Other than gender and age, road characteristics were also investigated to understand the nature of this relationship between drivers and pedestrians to a broader extent. From the interviews' thematic analysis, four themes related to participants' thoughts about yielding behavior were obtained: "Places of Interaction," "Trust in Rules," "Factors Affecting Yielding Behavior", and "Future Solutions." Both the analysis of interviews and the observations showed that driver-pedestrian interaction is an essential factor regarding traffic safety.

Keywords: drivers, pedestrians, yielding behavior, field study

Yol Verme Davranışı: Sürücülerin Yol Verme Davranışını Anlamak Üzerine Karma Yöntemli Bir Çalışma

Öz

Sürücülerin yayalara yol verme davranışını incelemek üzere saha gözlemleri ve yarı-yapılandırılmış mülakatlar yapılmıştır. 1140 araç-yaya gözlemi sonucunda yapılan Cramer'in V katsayısı ve lojistik regresyon analizleri, sürücü cinsiyeti ve yaya yaşı ile yol verme davranışı arasında anlamlı bir ilişki olduğunu göstermiştir. Yaş ve cinsiyetin yanı sıra, sürücü-yaya ilişkisinin doğasını anlamak adına yol özelliklerinin bu ilişkiye etkisi de incelenmiştir. Mülakatlar ise tematik analiz yöntemi ile incelenmiş ve katılımcıların yol verme davranışı ile ilgili düşünceleri 4 tema altında toplanmıştır. Bunlar; "Karşılaşma yerleri", "Kurallara olan güven", "Yol verme davranışını etkileyen faktörler" ve "Geleceğe yönelik çözümler" olarak belirlenmiştir. Hem saha gözlemleri hem de mülakatlar sürücü-yaya ilişkisinin trafik güvenliği ile ilgili önemli bir faktör olduğunu göstermiştir.

Anahtar Kelimeler: sürücüler, yayalar, yol verme davranışı, saha çalışması

Yielding the Right of The Way: A Mixed Design Study for Understanding Drivers' Yielding Behavior

For many reasons, in the world and Turkey, the percentage of death and injuries of the vulnerable road users, especially pedestrians, is very high as compared to other road users. According to the World Health Organization (2018), "universally, pedestrians and cyclists represent 26% of all deaths, with those using motorized two- and three-wheeler comprising another 28%". Moreover, in Turkey, the same pattern can be observed for pedestrian deaths and injuries. According to the data collected in 2018, in Turkey, the number of accidents involving pedestrians is 31.624, and it comprises 17% of all types of traffic accidents, which includes both injuries and deaths. Also, 1.294 of the accidents involving pedestrians are due to not slowing down on pedestrian and school crossings or ignoring the right of the way (Emniyet Genel Müdürlüğü Trafik Hizmetleri Başkanlığı, 2018). The statistics mentioned above indicate that the safety of vulnerable road users, especially pedestrians' safety, is critically endangered. Therefore, studies should be conducted to understand the causes of the injuries or fatalities, then find solutions considering the underlying mechanisms for these accidents. As mentioned, although pedestrians have a right to cross by using crosswalks, the drivers of vehicles may not yield to pedestrians. So, this constitutes a severe problem for pedestrians who want to use crosswalks. One of the purposes of this study is to understand the priorities of driver's yielding behaviors to enlighten the reasons for traffic accidents that may occur on the crosswalks.

In the literature, many reasons that affect the yielding behavior of drivers were listed. The speed of a vehicle, age, and gender of drivers are factors that affect yielding behavior. For instance, it was observed that when the speed of vehicles increased, the likelihood of drivers' yielding behavior decreased (Fitzpatrick, 2006). Also, older drivers are more likely to yield than younger drivers (Harrell, 1993a). In another study, it was found that men are more likely to stop for pedestrians who are women (Harrell, 1993b).

In terms of pedestrian characteristics, volume, assertiveness, visibility, clothing, and special conditions of pedestrians are essential for yielding behavior (Harrel, 1993b; Schneider & Sanders, 2015; Shaon et al., 2018). For example, when a group of pedestrians rather than a single individual cross the street, drivers are more likely to yield (Salamati, Schroeder, Geruschat, & Rouphail, 2013). When the pedestrians are insistent about crossing the road, and, they are visible to drivers, they can cross safely and comfortably. To illustrate, when a pedestrian was standing in the crosswalk, a higher probability of yielding behavior was observed compared to standing at the curb or 1 ft from the curb (Geruschat & Hassan, 2005). Also, drivers were more likely to yield when pedestrians display more assertive behaviors, such as entering the crosswalk rather than waiting on the sidewalk (Shaon et al., 2018). Regarding special conditions for pedestrian characteristics, it was found that drivers tend to yield to blind pedestrians more often than to sighted pedestrians (Geruschat & Hassan, 2005).

In addition to pedestrian and driver characteristics, different road characteristics can also influence the yielding behaviors of drivers. According to Schneider and Sanders (2015), fewer roadway lanes and lower speed limits were associated with increased yielding behavior. Moreover, yielding is increased at the entry leg of a roundabout as compared to the exit of a roundabout (Salamati et al., 2013). Close to bus stops, average stopping behavior that was detected is significantly weaker (Craig, Morris, Van Houten, & Mayou, 2019). Studies that were mentioned above suggest that the factors that are associated with yielding behavior can be categorized as the characteristics of drivers, pedestrians, and the environment. This triad consists of many aspects related to yielding behavior, including implicit and explicit characteristics of them and their relationships with each other.

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Besides those factors, a study showed that drivers of public vehicles were more likely to yield, especially when there was high-visibility police enforcement (Craig et al., 2019). Another study found that "after the intervention of high-visibility enforcement, it was observed that a higher rate of drivers' yielding behavior to pedestrians who show a moderate level of assertiveness" (Shaon et al., 2018). So, the laws can influence the priorities of the drivers' yielding behaviors, especially the enforcement of the rules. When this enforcement is not strict enough for both drivers and pedestrians, the number of yielding behaviors can be low.

There is a wealth of studies in the literature employing field observations and lab experiments as the method for studying the yielding behavior of drivers (Fitzpatrick, 2006, Shaon et al., 2018). Few studies have interviewed with drivers to understand priorities of yielding behavior. For example, a telephone survey was conducted with licensed Virginia drivers to assess self-reported knowledge and behaviors (Hebert Martinez & Porter, 2004). Also, another paper attempted to understand driver and pedestrian interactions from a macro perspective by using an Internet survey throughout North America. However, there are no studies to combine both qualitative and quantitative methods for examining yielding behavior (Schneider & Sanders, 2015).

The lack of combining various methods in the literature directed us toward conducting both observations of the yielding behaviors and interviews with the drivers. According to Eby (2011), natural observation studies have strong construct and face validity, which shows that they are likely to represent reality. However, the reasons behind drivers' behaviors cannot be understood just by observing. Therefore, this study possesses both qualitative and quantitative methods.

1.1. Aims of the Present Study

There are several aims of the current study. First, the purpose of the quantitative part of this study is to observe in which situations the drivers give way to pedestrians. Second, the qualitative section aims to look at the underlying causes of drivers when they give way to pedestrians and when not. To achieve these goals, observations and interviews with drivers were conducted simultaneously. Observations took place in a relatively closed traffic system in Ankara. Also, the interviews were conducted only with the people in the same traffic system to relate the data of observation with the interviews. The third purpose of the current study is to see the relationship between drivers' yielding behavior and characteristics of drivers and pedestrians. Finally, the role of environmental characteristics (e.g., curved road, raised crosswalk) was investigated to have a better understanding of the yielding behavior.

2. Study I

2.1. Method

2.1.1 Participants.

There were 1140 observations, including 1124 drivers (280 females, 844 male) and 1137 pedestrians (499 females, 638 male). The age of the drivers was identified as young adults (N=489), middle-aged adults (N=559), and elderly (N=80) by the observers. The age of pedestrians was also recorded as children (N=8), young adults (N=979), middle-aged adults (N=122), and elderly (N=29).

2.1.2. Materials.

An observation form was used to note the observation time, place, weather condition, pedestrians' and drivers' age and gender, and whether the drivers yield the right of the way

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specifically. Moreover, the type of vehicles and special situations of pedestrians were observed. During the encoding of those results into the statistical program, driver and pedestrian age were numbered in descending order since driver age group and pedestrian age group do not have necessarily matching age levels (there is a child option in the pedestrian variable, whereas there is none in the driver variable). Therefore, the direction of the regression implies an opposite relationship for increasing age groups. Meanwhile, gender was noted as "1" or "2" for respectively women and men in a binary manner.

2.2. Procedure

Necessary permissions and ethical approval were taken from the Departmental Human Subjects Ethical Committee of the University. Before starting observations, a pilot study was conducted to train the four observers. Observation places were chosen in terms of the road (curved, straight) and crosswalk (standard, raised) characteristics within the observation area. As mentioned in the introduction, entry, or exit leg of a roundabout, which is one of the factors affecting the yielding behavior, were also considered. Attention was paid to the absence of a bus stop at the observed locations. Then, the observations were made on six crosswalks within four places that have the possibility of high interaction between drivers and pedestrians. The speed limit within the observation area was between 30 km/h and 50 km/h. Three of the crosswalks were standard crosswalks, whereas three of them were raised crosswalks. Three of the crosswalks were on a straight road, whereas the other three were just after a curved road. These locations were:

  -1st Place: standard crosswalk, curved road
  -2nd Place: raised crosswalk, straight road
  -3rd Place: standard crosswalk, straight road
  -4th Place: standard crosswalk, straight road
  -5th Place: raised crosswalk, curved road
  -6th Place: raised crosswalk, curved road.

The observations were made on six days, three times a day, and one hour for each time slot. The first group of observations took place on 6 December 2019 (Friday), 9 December 2019 (Monday), and 12 December 2019 (Thursday). The second group of observations was made on 10 February 2020 (Monday), 13 February 2020 (Thursday), and 14 February 2020 (Friday). Observation times were between the hours of 08.30-09.30 for the morning, 12.30-13.30 for noon and 17.30-18.30 for the evening (see Table 1.) The time and locations were assigned randomly to each observer.

While observing, the observers paid attention to some situations of pedestrians and drivers. In order to eliminate the effect of the pedestrians' volume, situations with one pedestrian and one driver were observed on the crosswalks. For instance, when several pedestrians are crossing, the first pedestrian seen by the driver was noted. When there are several vehicles stopped for yielding, the first vehicle that yielded was noted. Since the aim of the study was to understand drivers' and pedestrians' characteristics, only those one to one interactions were recorded. Observers paid attention to the distances where the driver and pedestrian could interact. Waiting on the sidewalk one meter away from the road, stepping into the pedestrian crossing and looking in the direction the drivers came from counts as a specific behavior that indicates pedestrian crossing requests. Besides, for the drivers, it is determined that when the drivers slow down and stop for the pedestrians away from not more than 2 meters from crosswalks.

Table 1. *The Observation Time and Places of the Observers*

Date	Time	Observer 1	Observer 2	Observer 3	Observer 4
	Morning	3rd Place	4th Place	1st Place	6th Place
06.12.2019	Noon	1st Place	6th Place	3rd Place	4th Place
	Evening	4th Place	1st Place	6th Place	3rd Place
	Morning	6th Place	3rd Place	4th Place	1st Place
09.12.2019	Noon	3rd Place	4th Place	1st Place	6th Place
	Evening	1st Place	6th Place	3rd Place	4th Place
	Morning	4th Place	1st Place	6th Place	3rd Place
12.12.2019	Noon	6th Place	3rd Place	4th Place	1st Place
	Morning	5th Place	6th Place	3rd Place	2nd Place
10.02.2020	Noon	6th Place	5th Place	2nd Place	3rd Place
	Evening	3rd Place	2nd Place	5th Place	6th Place
	Morning	2nd Place	3rd Place	6th Place	5th Place
13.02.2020	Noon	5th Place	6th Place	3rd Place	2nd Place
	Evening	6th Place	5th Place	2nd Place	3rd Place
14.02.2020	Morning	3rd Place	2nd Place	5th Place	6th Place
	Noon	2nd Place	3rd Place	6th Place	5th Place

2.3. Results

2.3.1. Descriptive Statistics.

The frequencies of those variables and the behavior of yielding the right of way are displayed in Table 2 below. As can be seen in Table 2, female drivers (52%) yielded the right of way more frequently than their male counterparts (47%). On the other hand, female pedestrians were more likely to be given the right of way to cross over as compared to male pedestrians (52% and 45%, respectively).

The age of the driver tended to make a difference as well that early adult drivers demonstrated more engagement in the precedence of the pedestrians on the crosswalks compared to middle-aged drivers (57% and 41%, respectively). Furthermore, the function of the vehicle was one of the most prominent contributors to the tendency to yielding the right of way. 51% of private vehicles seemed to approve the rules, whereas a much lower proportion of commercial vehicles (33%) engaged in such behavior. Finally, the impact of the weather on the condition of the road was another critical factor. Road surface wetness seemed to decrease the likelihood that drivers would enable pedestrians to cross over the street (wet road being 41% and on the contrary, dry road 50%).

Table 2. *Frequencies of yielding and not yielding by study variables*

	Yielded	Did not yield		Yielded	Did not yield
Driver Gender			**Pedestrian Gender**		
Female	146	134	Female	261	238
Male	398	452	Male	284	354
Driver Age			**Pedestrian Age**		
Early adult	264	225	Child	6	2
Middle-aged	237	322	Early adult	467	512
Old	42	38	Middle-aged	59	63
			Old	13	16

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Table 2 cont'd. *Frequencies of yielding and not yielding by study variables*

	Yielded	Did not yield		Yielded	Did not yield
Type of the Vehicle					
Passenger car	477	455	**Weather**		
Taxi	39	85	Dry, without rain	451	457
Minibus	10	18	Wet, without rain	38	55
Bus	18	30	Light rain	56	82
Lorry	1	5			
Tractor	0	1	**Location**		
Presence of a Curve before the Crossing			1st Place	205	178
Yes	351	349	6th Place	109	117
No	194	245	4th Place	16	29
Presence of an Elevation on the Crossing			3rd Place	48	118
Yes	271	264	2nd Place	127	93
No	274	330	5th Place	40	59
Day			**Time of the Day**		
Monday	217	240	Morning	177	198
Thursday	155	189	Noon	188	226
Friday	173	165	Evening	180	170

2.3.2. The strength of the association between yielding the right of way and study variables.

As the data is comprised of nominal or ordinal variables with a skewed distribution, Cramer's V was used to determine the strength of the association among variables (Akoğlu, 2018). The results suggested that there was a significantly strong relationship between yielding behavior and location ($V > .15$, $p < .01$). Furthermore, it was found that other variables such as type of the vehicle and driver age had a significantly moderate relationship with yielding behavior ($V > .10$, $p < .01$, for each). The gender of pedestrians and the existence of a curve before the crossing were also found to possess a significant relationship with yielding the right of way, but the strength of the association tended to be weak ($V > .05$, $p < 0.05$, for each). Finally, other independent variables in the study, the gender of drivers and the age of the pedestrians, and further remaining control variables did not have a significant relationship with yielding the right of way. The interpretation of the results is presented in detail in the discussion section below.

Table 3. *The strength of the relationship between study variables*

	Cramer's V Value	Approximate Significance
Driver age	.114	**.001**
Pedestrian age	.047	.477
Driver gender	.046	.122
Pedestrian gender	.077	**.009**
Type of the vehicle	.147	**.000**
Elevation	.053	.074
Curve	.058	**.050**
Location	.193	**.000**
Weather	.072	.051
Date	.048	.272
Time of the day	.050	.241

2.3.3. Yielding the right of way on the crosswalks by age and gender characteristics of the drivers and the pedestrians.

To understand the effects of age and gender of the pedestrians and drivers on the likelihood of giving the right of way, logistic regression was performed. The model was statistically significant, $\chi^2(4) = 14.180$, $p < .01$. According to the pseudo-R-squared measures, Nagelkerke R^2, the logistic regression model only explained 0.17% of the variance in giving the right of way. As can be seen in Table 4, the model correctly classified 54.5% of cases. There was not a significant difference across genders of drivers; on the other hand, women were more likely to be given the right of the way as pedestrians ($p < .05$).

Furthermore, increasing age was negatively associated with yielding the right of way as drivers ($p < .05$). Still, the age difference did not have a significant relationship with being given the right of way (see Table 5). Given the data of the observation did not possess normal distribution, further analysis of variance could not be performed to determine the interaction effect between age and gender characteristics of pedestrians and drivers. Instead, the sample was divided into two groups by the gender of the driver to determine the variables that would be influential in their tendency to yield the right of way.

Further binomial logistic regressions were performed for both groups. The model revealed that driver age and pedestrian gender were statistically significant predictors of yielding the right of way for male drivers ($p < .01$, $p < .05$ respectively). In contrast, there was not any statistically significant predictor for yielding behavior of female drivers. The sample was again divided into two groups depending on the gender of pedestrians. It was found that there was not a significant predictor for female pedestrians, on the other hand, driver age predicted the likelihood of being yielded the right of way for male pedestrians significantly ($p < .05$). Lastly, the sample was divided in accordance with the age of drivers. Pedestrian gender had a statistically significant relationship with each age group ($p < .05$). In contrast, driver gender was only significant for middle-aged drivers ($p < .01$), which suggests that gender differences decrease for younger generations. Detailed information regarding these analyses can be seen in Tables 6, 7, 8, and 9. All of those analyses indicate that male drivers are more likely to yield the right of way for female pedestrians, and the tendency to not yielding the right of way to male pedestrians was especially observed in middle-aged male drivers than younger male drivers. On the other hand, women drivers did not demonstrate any distinction among pedestrian groups.

Table 4. *Percentage accuracy in correction*

		Predicted Right of Way		
		Yes	No	Percentage Correct
Observed Right of Way	Yes	188	355	34.6
	No	158	426	72.9
Overall Percentage				54.5

Table 5. *The results of the binomial logistic regression analysis*

	B	S.E.	Wald	df	Sig.	Exp(B)
Driver Gender	-.183	.140	1.707	1	.191	.833
Pedestrian Gender	-.304	.121	6.298	1	.012	.738
Pedestrian Age	-.053	.136	.149	1	.699	.949
Driver Age	-.234	.100	5.542	1	.019	.791
Constant	.956	.456	4.403	1	.036	2.602

Table 6. *The results of the regression analysis for only male drivers*

	B	S.E.	Wald	df	Sig.	Exp(B)
Pedestrian Age	.073	.161	.208	1	.648	1.076
Driver Age	-.413	.115	12.795	1	.000	.662
Pedestrian Gender	-.341	.140	5.903	1	.015	.711
Constant	1.028	.530	3.766	1	.052	2.795

Table 7. *The results of the regression analysis for only male pedestrians*

	B	S.E.	Wald	df	Sig.	Exp(B)
Pedestrian Age	.068	.175	.152	1	.697	1.071
Driver Age	-.426	.138	9.568	1	.002	.653
Driver Gender	.181	.188	.937	1	.333	1.199
Constant	.892	.615	2.104	1	.147	2.439

Table 8. *The results for the regression analysis for only young adult drivers*

	B	S.E.	Wald	df	Sig.	Exp(B)
Pedestrian Age	-1.009	1.003	1.011	1	.315	.365
Driver Gender	.363	.644	.317	1	.574	1.437
Pedestrian Gender	1.077	.470	5.245	1	.022	2.936
Constant	2.027	3.052	.441	1	.507	7.591

Table 9. *The results for the regression analysis for only middle-aged drivers*

	B	S.E.	Wald	df	Sig.	Exp(B)
Pedestrian Age	.181	.181	1.007	1	.316	1.199
Driver Gender	.766	.215	12.701	1	.000	2.151
Pedestrian Gender	.395	.175	5.087	1	.024	1.485
Constant	.181	.181	1.007	1	.316	1.199

2.4. Discussion

The current study aimed to examine the relationship between characteristics of individuals (gender, age, etc.) and drivers' tendencies to yield on the crosswalks. The role of those variables depending on the different nature of pedestrians and drivers were illustrated above. To interpret those variables in detail, the sample was repeatedly divided into specific subsamples, and further analyses were conducted. In light of the observations, it was shown that age and gender have different influential mechanisms depending on whether individuals are drivers or pedestrians. Contrary to other studies that support possible sex differences in yielding behavior (Jamieson, 1977; Veevers, 1982), there was not any such sex difference among drivers when it comes to yielding the right of way. Changes in those observations could be tied to the changing demographic background of drivers over the years (Emniyet Genel Müdürlüğü, 2019; Sivak, 2015). The increased representation of women in traffic could have also changed the proportional differences of educated drivers amongst women and men. As women had less access to own a driving license before, those who had could be from higher socioeconomic status or educational level. That could have resulted in increasing the likelihood that observed women in existing literature engaged in more yielding behavior. On the other hand, the impact

of educational differences moderated by gender is nullified, because the present study was conducted with participants having a high educational level. The current study also indicated different findings from a similar study conducted by Rosenbloom, Nemrodov, & Eliyahu (2006) that drivers did not necessarily yield the right of way at a higher rate to their own age group. The main distinction among those different age groups was that as age increases, gender differences in yielding behavior become more salient. Even though there was not any significant influence of age for female drivers, the overwhelming behavioral difference among young adults and middle-aged male drivers, and the prevalence of the male drivers in the observation were enough for driver age to be considered as an important predictor of yielding. Regardless of age groups, individuals tended to yield the right of way to women more than they did to men. Considering the demographics of the participants in the study, some key factors that might have a direct impact on the result should be underlined. Firstly, the range of driver age in the current study varied more on male drivers in comparison to their female counterparts. Secondly, commercial vehicles were predominantly driven by middle-aged male drivers, which could further extend the already existing age differences. Thirdly, the sample size leaned towards the more educated part of society. Finally, speed restrictions and different flow of traffic on the observed traffic setting might have contributed to different behavioral outcomes than urban traffic settings.

Chi-square measures that were conducted to control variables in the study showed that associations between some variables and the tendency to yield the right of way are strong enough to be potentially considered as one of the main factors in that behavior. Control variables in the study could be categorized into two different groups: traffic factors and external environmental factors. Variables in those factors varied in magnitude and significance compared to other in-group variables. The most critical traffic factors were the type of vehicle and location. The influence of the type of vehicle may have two essential aspects, which are the size and the function of the vehicle. The function of the vehicle was found to be especially important, considering private vehicles tended to yield the right of way more frequently. Time spent on the road could be more valuable for commercial vehicles, which could explain their reluctance to wait for pedestrians to cross over. Those results suggest a quite different picture than some of the studies in the literature, which underlined that public transport vehicles were more likely to yielding behavior (Craig et al., 2019). In that study, high visibility enforcement was mainly found to be influential in more compliance with yielding for public transport vehicles. Instead, the observed traffic setting is not a location where high visibility of enforcement is observed; this, as a result, could have diminished the salience of traffic rules in those drivers. However, less compliance in yielding for public transportation vehicles could have been replicated in more urban traffic settings considering those vehicles work on a more rigid schedule than private vehicles. Those locations where drivers yielded the right of way more were mostly those crossings that experienced high pedestrian traffic. Therefore, the number of pedestrians on the sidewalk, as implicated by other researches such as the qualitative study conducted by Schneider & Sanders (2015), could increase the likelihood that they would be yielded the right of way by drivers even if an increasing amount of pedestrians crossing over would also increase the stoppage time of the vehicles. Even though the curve of the road was found to have a significant association with yielding the right of way, that result could be mediated by the impact of locations. Those locations high in human traffic happened to have a curve before the crossing as well, further research could be conducted to examine the impact of the curve and thus decreasing speed. Meanwhile, it was revealed that environmental factors did not have a significant association with yielding the right of way. Whereas the frequency of yielding the right of way was higher on days without rain, the relationship was not strong enough to be statistically significant. However, if the criterion is road surface wetness, the

likelihood of yielding behavior tends to decrease as the road surface wetness increases ($V > .05$, $p < .05$) slightly.

3. Study II

3.1. Method

3.1.1 Participants.

Data were collected from 11 participants, nine male and two female active drivers aged between 22 and 24 who are students at the university in which the observations in Study I took place. As can be seen in Table 10, the participants' years of active driving were between 0.5 and 7 years; the estimated monthly mileage ranges from 0 to 2000 kilometers.

Table 10. *Participants' characteristics*

Participant	Age	Gender	Years of Active Driving	Estimated Monthly Mileage
Participant 1	24	Male	6	250
Participant 2	23	Female	5	900
Participant 3	22	Male	0.5	0
Participant 4	23	Male	4	100
Participant 5	23	Male	4.5	400
Participant 6	24	Male	1	1200
Participant 7	23	Male	4	350
Participant 8	23	Male	7	1200
Participant 9	24	Male	5	1000
Participant 10	22	Female	4	400
Participant 11	23	Male	5	2000

3.1.2. Procedure.

After taking the ethical approval from the University, prospective participants were contacted using a convenience sampling method. In other words, participants were invited wherever they can be found and typically wherever is convenient. Appropriate dates and times were determined, and interviews were arranged with the participants who agreed to participate in the study. Before starting the interviews, the participants were briefly informed about the nature and content of the study. In essence, they were asked if they had any problems with voice recording during the interview, and (if there is not a problem), both verbal and written confirmation of their voluntary participation was obtained. Then, voice recording was started, and the interview questions were asked to the participants. The procedure was repeated for each participant until saturation was achieved in the responses. When the data collection process was completed, verbatim transcription of the data collected from the participants was performed, and data analysis was started.

3.1.3 Materials.

3.1.3.1. Demographic Information Form

Firstly, some demographic questions were asked to the participants. In this section, the participants were asked about their age, gender, educational level, income level, active driving time, and estimated monthly mileage.

3.1.3.2. Interview Form

Semi-structured interview questions were selected based on the study variables in Study I to have a better understanding of the relationship between those variables. Interviews were used to get information about participants' yielding behavior. A voice recorder was used to record the answers to these questions. The interview was structured around ten main questions. In the selection of interview questions, the main objective was to investigate the factors that affect the yielding behavior of the participants in the most comprehensive way possible. In other words, the main questions of the research and supportive questions that naturally arise in the flow of the interviews were chosen in a way to get the participants to think about the environment, human and vehicle factors that are influencing the yielding behavior. The course aimed to produce interpretations that can reveal how they interpret the interaction of these factors. The main questions posed to the participants in the interview are presented in Table 11.

Table 11. *Main questions asked to participants in the interview*

1. How and in which situations do you think drivers and pedestrians interact with each other in traffic?

2. How do you think the interaction between drivers and pedestrians should be in traffic?

3. What do you think are the positive or negative characteristics of the pedestrian crossings as a driver?

4. How often and under what circumstances do you yield the right of the way or stop for pedestrians who want to cross a pedestrian crossing in places without traffic lights?

5. What do you think are the factors that cause a driver to yield right of the way to pedestrians at the pedestrian crossing?

6. If you think about the pedestrians that you yield the right of the way, do you think these pedestrians have specific common characteristics?

7. What do you think are the factors that cause a driver to not yield right of the way to pedestrians at the pedestrian crossing?

8. If you think about the pedestrians that you don't yield the right of the way, do you think these pedestrians have certain common characteristics?

9. In your opinion, what are the environmental factors that affect driver-pedestrian conflict in traffic?

10. What do you think can be done to minimize the driver-pedestrian conflict in traffic?

3.2. Analysis

After the transcription of the data completed, data analysis started. Thematic analysis is used in qualitative research and focuses on examining themes or patterns of meaning within data. This method can emphasize both organization and detailed description of the data set and theoretically informed interpretation of meaning. Coding is the primary process for developing themes by identifying items of analytic interest in the data and tagging these with a coding label. In the first step, the data is read thoroughly, and the participants' sayings are examined in depth. At this stage, distinctive expressions and emotional responses are noted. In the next step, sub-themes are created by conceptualizing the notes. Related sub-themes are grouped to cluster the top themes (Braun & Clarke, 2006). This path was followed in this study.

3.3. Results

In the present study, there were four themes related to participants' thoughts about yielding behavior: "Places of Interaction", "Trust in Rules", "Factors Affecting Yielding Behavior", and "Future Solutions". The first theme places of interaction has two sub-themes, which are

"Pedestrian Crossing" and "Red Lights". There is no sub-theme for the second theme, trust in rules. Three sub-themes were identified for the third theme, factors affecting yielding behavior. These are "Empathy", "Double Trouble: Vulnerable Road Users", and "Pedestrian Assertiveness and Behavior ". Finally, under the fourth theme, "Future Solutions", two sub-themes have emerged, which are "Punitive Sanctions" and "Infrastructure."

Table 12. *Themes, sub-themes and significant statement examples*

Themes and Sub-themes	Significant Statement Examples
Places of Interaction	
Pedestrian Crossings	*"Sürücüler ve yayalar yol verme olarak sadece etkileşime geçerler, yaya geçidinde."*
Red Lights	*"...kırmızı ışıklarda, ya da işte yayaların karşıdan karşıya geçmeye çalıştığı her durumda."*
Trust in Rules	*"Yani kurallara uyulduğu sürece zaten yazılı kurallar var. Onlara uyulduğu sürece bence her şey olumlu yönde gelişecek."*
Factors Affecting Yielding Behavior	
Empathy	*"Empati yani başka bir şey değil kendini onun yerine koyuyorsun, o an bir yaya oluyorsun."*
Double Trouble: Vulnerable Road Users	*"Yani yaşlı olduğu zaman, benim yaşlı ya da hani hamile tarzı şeylerde, işte daha yol vermeme gibi durumum pek olmuyor."*
Pedestrian Assertiveness and Behavior	*"Böyle lay lay lom geçiyorlar, hani yavaş yavaş geçiyorlar. Bir de hani sonsuza kadar orada beklememiz gerekiyormuş gibi bir tavırla geçiyorlar."*
Future Solutions	
Punitive Sanctions	*"Sürücüler ne yapabilir yayalar ne yapabilir yetkililer kurallara uymayanlara direkt istisnasız ceza vermesi gerekiyor."*
Infrastructure	*"Yaya geçitleri çok daha belirgin şekilde yapılabilir yani. Mesela bizim okuldaki yaya geçitleri gayet belirgin olduğu için bence onun da etkisi vardır*

3.3.1. Places of Interaction.

The first theme that emerged when the drivers' experiences in traffic were examined was drivers' and pedestrians' places of interaction. This theme is followed by two sub-themes, pedestrian crossings, and red lights.

3.3.1.1. Pedestrian Crossings

When the data is examined, most of the participants seem to agree with the response of pedestrian crossings as the place where pedestrians and drivers interact. Even though pedestrians could be crossing the street from another point, the interaction is comparably less as there are no set rules and regulations at those points. Below are examples.

"Sürücüler ve yayalar yol verme olarak sadece etkileşime geçerler, yaya geçidinde." (Participant 2, 22)

"Yaya geçitlerinde etkileşime geçerler, sürücüler yayalara yol verir." (Participant 9, 24)

"Yaya geçitlerinde, yol verirken… bu kadar." (Participant 7,23)

3.3.1.2. Red Lights

When participants were asked where pedestrians and drivers interact, most of them said red lights since the traffic lights and pedestrian crossing lights change interchangeably, allowing either to cross at one point in time. Below are examples.

"…kırmızı ışıklarda, ya da işte yayaların karşıdan karşıya geçmeye çalıştığı her durumda." (Participant 8, 23)

"Yani kırmızı klasik ışıklarda zaten etkileşime geçiliyor…" (Participant 10, 22)

3.3.2. Trust in Rules.

Many participants stated that as long as the rules were followed, there would be no problems in traffic. The adequacy of the existing order, rules, and trust in these rules emerged as a top theme.

"Yani kurallara uyulduğu sürece zaten yazılı kurallar var. Onlara uyulduğu sürece bence her şey olumlu yönde gelişecek." (Participant 10, 22)

"Kurallara uymamak. İki taraftan biri kurala uymuyorsa mesela biri kendi ışığını beklemeyip dalıyorsa, sürücü ya da yaya o zaman mevzu çıkıyor." (Participant 7, 23)

3.3.3. Factors Affecting Yielding Behaviour.

While looking at the yielding behavior of drivers, it can be seen that three factors affect yielding behavior. The first is the empathy of the drivers, and the second is the double trouble: vulnerable road users, and the third is pedestrian awareness and action.

3.3.3.1. Empathy

Most of the participants mentioned that they are pedestrians themselves— from time to time— so they can understand the pedestrians and try to give the right of way more and frequently.

"Empati yani başka bir şey değil kendini onun yerine koyuyorsun, o an bir yaya oluyorsun." (Participant 4, 23)

"…ben de yaya olurum yani, empati kurar insan. Der yani ondan sonra yani yol verilmesi lazım." (Participant 9, 24)

"Sabırlarını biraz daha kontrol edebilirler, yani empati kurabilirler, onlar da bir zamanlar yayaydı. Daha doğrusu bu konsept için empati direkt şey olur, karşı taraf olarak kendini görmek olaya daha iyi yaklaşmalarını sağlar her insan için." (Participant 3, 22)

3.3.3.2. Double Trouble: Vulnerable Road Users

Most participants said that as a driver, they yield more when the participants are elderly, pregnant, or disabled (as it is a common courtesy of respect and morals). Showing more respect for the elderly in Turkey represented as a reason.

"Yani yaşlı olduğu zaman, benim yaşlı ya da hani hamile tarzı şeylerde, işte daha yol vermeme gibi durumum pek olmuyor." (Participant 2, 22)

"Yani mesela orda önümdeki kişinin bebek taşıyan bir anne olduğunu görsem veya yaşlı bir insan olduğunu görsem belki eğer onu daha önceden fark edersem daha çok yol verebilirim…" (Participant 5, 23)

"Özel durum her zaman daha öncelikli…" (Participant 6, 24)

"Kesinlikle yaşlılara daha çok yol veriyorum." (Participant 11, 23)

3.3.3.3. Pedestrian Assertiveness and Behavior

Participants mentioned that they do not yield the right of way to pedestrians with specific characteristics or specific behaviors. For example, participants that are not interested in the road most probably focused on their phones, who are paying attention in other places, jaywalking on the road, and jumping on the road inattentively.

"...dalgındır, hani müzik dinliyordur bir şeydir. Kendi arkadaşlarıyla laga luga yapıyordu başka hiçbir şeyin farkında olmuyordur…" (Participant 10, 22)

"...Acelecilik, iki taraf içinde hani şoför için yavaşlamama, yaya için yola atlama, direkt zıplama olarak…" (Participant 6, 24)

"Böyle lay lay lom geçiyorlar, hani yavaş yavaş geçiyorlar. Bir de hani sonsuza kadar orada beklememiz gerekiyormuş gibi bir tavırla geçiyorlar." (Participant 2, 22)

"Ya da işte şeyde yol vermem, yaya geçidi dururken onun 5 metre ilerisinden 5 metre gerisinden, ordan burdan yola atlayan insanlara yaya geçidi yakınlarında, yakınlarda bir yaya geçidi varken her yerden yola atlıyorlarsa vermem." (Participant 8, 23)

3.3.4. Future Solutions.

Many participants mentioned solutions and forward-looking services such as regulation of infrastructure services and increasing penal sanctions for fewer traffic problems. When considering Turkey's economic situation, traffic fines might be deterrent. Besides, many participants talked about the insufficient infrastructure in traffic, for example, the lack of pedestrian crossings and traffic lights.

3.3.4.1. Punitive Sanctions

Most of the participants agreed that taking Turkey's economic situation into account, issuing deterrent fines is an effective method in reducing the number of traffic problems.

"Sürücüler ne yapabilir yayalar ne yapabilir yetkililer kurallara uymayanlara direkt istisnasız ceza vermesi gerekiyor." (Participant 1, 24)

"Burda yetkililerin oralara kamera konularak hani bir yaya geçmeye çalışırken üstüne üstüne eğer arabalar sürüyorsa. Yani bizim halkımız genelde cezadan anlıyor. Ceza işlemleri artırılarak." (Participant 11, 23)

3.3.4.2. Infrastructure

Apart from criminal sanctions, many participants saw the improvement of infrastructure, including environmental regulations, as a solution to reduce traffic problems. These improvements in infrastructure include putting more traffic lights on the roads, overpasses, underpasses, and green waves.

"eğer trafik var ve bütçeleri yetmiyorsa oraya en azından bir ışık koymaları gerektiğini düşünüyorum. Yaya ışığı, burada yeşil yanıyor yayalar geçsin gibi bir algı oluşturmaları lazım, kalabalık yerlerde diye düşünüyorum." (Participant 3, 22)

"Üst geçitler. Maliyeti düşünmek istemiyorsa da yine ışık koyulabilir. Cezai yaptırımlar artabilir. Başka ne yapılabilir, yeşil yol diye bir şey var. Belirli bir hızda gidersen sürekli yeşil ışıkta geçiyorsun. O yaygınlaştırılabilir." (Participant 7, 23)

"Yaya geçitleri çok daha belirgin şekilde yapılabilir yani. Mesela bizim okuldaki yaya geçitleri gayet belirgin olduğu için bence onun da etkisi vardır daha çok yol vermemde." (Participant 5, 23)

3.4. Discussion

The purpose of the qualitative part of this study is to investigate observed and reported results of the quantitative study. In addition, it is aimed to determine the solution methods that will reduce the traffic problems in the future and further improve the pedestrian-driver relationship.

As a result of the qualitative study and inconsistent with the quantitative study, most of the participants stated that factors such as age and gender do not affect the frequency of yielding behavior, and they yield the right of the way in every situation. However, as a result of the quantitative study, which gives importance to pedestrian priority, it was found that the yielding behavior rate was around 50%. These findings may indicate evidence that people are under the influence of social desirability bias in interviews of the qualitative study.

The first of the themes that appeared in this study were places of interaction, and two sub-themes were pedestrian crossings and red lights, that emerged as underlying themes. Within the scope of these sub-themes, it can be said that the interactions between the participants and the pedestrians are where the rules are mandatory. In other words, they have no intention of yielding the way to pedestrians or paying any attention except at pedestrian crossings and red lights. The interaction between them could also simply be a glance. However, when the car is going faster than usual, this kind of interaction might not have occurred.

In the current study, the second theme discovered was the trust in rules and regulations. Many participants mentioned that as long as the rules are followed, there will be no problems in the traffic flow. The reason for this is that in Turkey, it is ubiquitous that regulations are often overlooked and not paid attention to. In Turkey, for example, when looking at the traffic violation rate in 2008, a total of 8,063,470 violation traffic rules occurred while 600,000 of these violations occurred because traffic signs and lights were not followed, almost 1 million violations occurred by exceeding speed limits (Kirmizioglu, 2010). According to the Traffic Accident and Inspection Statistics of 2018, exceeding the speed limit is the violation that caused death the most with the percentage of 39.1 ("Trafik Kaza ve Denetim İstatistikleri", 2019, p. 78). Besides, according to the pedestrian defect distribution table that caused traffic accidents in 2018, not following the crossing rules in places where crossings and junctions are not available to cause traffic accidents the most with percentage 35.55 ("Trafik Kaza ve Denetim İstatistikleri", 2019, p. 77). As can be deduced from these results, violations such as exceeding the speed limit and actions such as not following the rules have a significant rate in causing deaths and accidents. In other words, if regulations are followed, it produces fewer traffic problems in general.

Moreover, the third theme that is present is the factors affecting yielding behavior, which involves three sub-themes: empathy, double trouble: vulnerable road users, and pedestrian assertiveness and behavior. As a first sub-theme, empathy is referred to as the "other-centered" emotion, which can be derived from observing other individuals that are in need and when putting themselves in the shoes of the person experiencing the situation (Batson, 1991). In this study, having empathy has been established as an essential factor in yielding the right of way. Which means that the drivers can put themselves in place of the pedestrians since they too were pedestrians themselves. Drivers might have also shown giving priority to pedestrians if they experienced being pedestrians in the past, especially during rainy days and extremely cold temperatures. As a second sub-theme, double trouble-vulnerable road users refer to pedestrians, who have a special situation such as blindness or being old. Consistent with the literature, the

participants stated that they yield the right of the way people with disabilities. For example, it was observed that motor drivers tend to yield right of the way to blind pedestrians rather than sighted pedestrians (Harrell, 1993a). Although it has not been studied in the literature, many participants stated that they would yield way to older pedestrians more. As a third sub-theme assertiveness and behaviors of pedestrians is a factor that affects the frequency of yielding behavior. The pedestrians' assertiveness to crossing seems to be positively correlated with the frequency of yielding the right of the way in the literature. For example, motorists were significantly more likely to stop for an assertive pedestrian who entered the crosswalk than for a passive pedestrian who remained on the sidewalk (Harrell, 1993b). However, inconsistent with the literature, in the current study, the assertiveness of pedestrians emerged as hindering the yielding behavior. Participants stated that jumping carelessly on the road with too much assertiveness decrease the probability of yielding behavior. Also, drivers are less likely to yield to pedestrians who are listening to music with headphones, not paying attention to the flow of traffic and jaywalking. It is because Turkish people are not sufficiently informed about the priority to pedestrians, and pedestrians' reckless behaviors may be perceived as disrespectful behavior.

The last theme in the current study is future solutions. The two sub-themes that appear under this theme are punitive sanctions and infrastructure. According to a study, since Turkey has a low level of law enforcement and lack of deterrent punishments for traffic offenses (Şimşekoğlu, Nordfjærn, & Rundmo, 2012) considering Turkey's economic situation, increasing penal sanctions seems to be a future solution for many participants. Besides, the instability of fines is another problem that increases the difficulties in traffic. For most first offenses, if they can easily convince the police officer, they would get off with just a warning, which causes inconsistency in sanctions. Therefore, it can be seen as a solution to give fines without exception. Another sub-theme is insufficient infrastructures. The inadequacy of infrastructure includes problems such as the lack of traffic lights, pedestrian crossings, and cameras. Participants stated that as such issues are solved, the problems in traffic will decrease. Some participants reported that innovative methods such as "green wave," which is when cars go with a constant speed in between traffic lights, where they almost always catch a green light (Ma & He, 2015).

4. General Discussion

In the quantitative study, the percentage of yielding behaviors of the drivers is very low in comparison to the qualitative study. In the interview, most of the participants reported that they always or most of the time give the right of way to pedestrians on crosswalks. However, in observations, the percentage of yielding behaviors was only 48.1%. In this way, it can be concluded that drivers do not always give the right of way despite their statements, and people reported in this way due to social desirability. In a similar study conducted in Turkey found that there was a response bias when participants reported their seatbelt use (Özkan, Puvanachandra, Lajunen, Hoe, & Hyder, 2012). Although attempts are made to ensure that the interviewed and observed people have similar features, there may have been a difference between the sample of the interviews and observations. As the majority of the drivers in interviews were young drivers, driving mostly in the same and specific traffic settings. In other words, if people being exposed to different traffic settings would be included in the study, this might affect the result.

4.1. Contributions

The present study is one of the rare studies being conducted at a specific part of the whole traffic system with its specific traffic-related characteristics. Moreover, this is the first study that combines qualitative and quantitative methods to examine the drivers' yielding behavior and

understand the priorities of this behavior. Also, this study differs from the literature concerning the characteristics of drivers and pedestrians. Most of the studies in the literature were dated decades earlier and took place in different driving cultures. Findings in those studies are not necessarily replicated in the observations of this study and suggested potential cultural or cohort differences on those characteristics. For the sample size, although the number of interviews was low, the number of observations was high, which is essential for generalization of the results. For further studies, similar studies that consist of both qualitative and quantitative methods can replicate the results to compare the observations and interviews.

4.2. Limitations

Equal numbers of raised or standard crosswalks and more egalitarian distribution of external variables (i.e. time of the day, or weekday and weekend distinction) could decrease potential sampling biases. Also, following studies can include other characteristics of the road, vehicle, pedestrian, and drivers, which have not been examined separately or comprehensively.

4.3. Implications

The results of this study showed us to take some precautions for the crosswalks to prevent pedestrians' injuries or even deaths. When drivers do not give the right of the way to pedestrians, even if the pedestrians try or want to cross the road, there will be some traffic accidents resulting in hitting the pedestrians. Therefore, some interventions which are either educational or high-visibility enforcement programs can be applied for both pedestrians and drivers. Such programs were mostly centered around increasing awareness and showed significant results in their attempts to initiate change in driving habits (Thomas, Blomberg, Peck, Cosgrove, & Salzberg, 2008; Cosgrove, Chaudhary, & Reagan, 2011). In order to increase awareness, the combination of data collection, earned and paid publicity, and higher degree of enforcement of specified traffic rule were used. Educational seminars on traffic rules, regulations, and enforcement can be prepared and given to people at different ages and the ones being exposed to different traffic situations. Both pedestrians and drivers should be informed about the issue of pedestrian priority, and misunderstanding should be corrected where and when it should be done. Particularly, the emphasis on yielding the right of way in the curriculum of driving schools could be the very first steps to such education. In addition, the visibility and accessibility of pedestrian crossings can be increased.

References

Akoğlu, H. (2018). User's guide to correlation coefficients. *Turkish Journal of Emergency Medicine, 18*(3), 91–93. doi: 10.1016/j.tjem.2018.08.001

Batson, C. D. (1991). *The altruism question: Toward a social-psychological answer*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*, 77–101.

Cosgrove, L., Chaudhary, N., & Reagan, I. (2011). *Four high-visibility enforcement demonstration waves in Connecticut and New York reduce hand-held phone use* (No. DOT HS 811 845). United States. National Highway Traffic Safety Administration.

Craig, C., Morris, N., Van Houten, R., & Mayou, D. (2019). Pedestrian safety and driver yielding near public transit stops. *Transportation Research Record: Journal of the Transportation Research Board, 2673*(1), 514–523.

Eby, D. W. (2011). Naturalistic Observational Field Techniques for Traffic Psychology Research. In *Handbook of Traffic Psychology*. doi:10.1016/B978-0-12-381984-0.10005-0

Emniyet Genel Müdürlüğü. (2019). *Araç ve Sürücü Belgesi İstatikleri 2017*

Fitzpatrick, K. (2006). *Improving pedestrian safety at unsignalized crossings*. Washington, D.C: Transportation Research Board.

Geruschat, D. R., & Hassan, S. E. (2005). Driver behavior in yielding to sighted and blind pedestrians at roundabouts. *Journal of Visual Impairment & Blindness, 99*(5), 286–302.

Harrell, W. (1993a). Older motorist yielding to pedestrians: Are older drivers inattentive and unwilling to stop? *The International Journal of Aging And Human Development, 36*(2), 115–127.

Harrell, W. (1993b). The impact of pedestrian visibility and assertiveness on motorist yielding. *The Journal of Social Psychology, 133*(3), 353–360.

Hebert Martinez, K., & Porter, B. (2004). The likelihood of becoming a pedestrian fatality and drivers' knowledge of pedestrian rights and responsibilities in the Commonwealth of Virginia. *Transportation Research Part F: Traffic Psychology and Behaviour*, *7*(1), 43–58.

Jamieson, B. D. (1977). Sex differences among drivers in yielding right-of-way. *Psychological Reports, 41*(3_suppl), 1243-1248.

Kirmizioglu, E. (2010). *Analysis of comprehension of traffic signs: a pilot study. (Unpublished master's thesis)* Middle East Technical University, Ankara, Turkey.

Ma, C., & He, R. (2015). Green wave traffic control system optimization based on adaptive genetic-artificial fish swarm algorithm. *Neural Computing and Applications*, *31*(7), 2073–2083.

Özkan, T., Puvanachandra, P., Lajunen, T., Hoe, C., & Hyder, A. (2012). The validity of self-reported seatbelt use in a country where levels of use are low. *Accident Analysis & Prevention*, *47*, 75–77. doi: 10.1016/j.aap.2012.01.015

Rosenbloom, T., Nemrodov, D., & Eliyahu, A. B. (2006). Yielding behavior of Israeli drivers: interaction of age and sex. *Perceptual and Motor Skills*, *103*(2), 387–390.

Salamati, K., Schroeder, B., Geruschat, D., & Rouphail, N. (2013). Event-based modeling of driver yielding behavior to pedestrians at two-lane roundabout approaches. *Transportation Research Record: Journal of the Transportation Research Board, 2389*(1), 1–11.

Schneider, R., & Sanders, R. (2015). Pedestrian safety practitioners' perspectives of driver yielding behavior across North America. *Transportation Research Record: Journal of the Transportation Research Board, 2519*(1), 39–50.

Shaon, M., Schneider, R., Qin, X., He, Z., Sanatizadeh, A., & Flanagan, M. (2018). Exploration of pedestrian assertiveness and its association with driver yielding behavior at uncontrolled crosswalks. *Transportation Research Record: Journal of the Transportation Research Board*, *2672*(35), 69–78.

Şimşekoğlu, Ö., Nordfjærn, T., & Rundmo, T. (2012). Traffic risk perception, road safety attitudes, and behaviors among road users: a comparison of Turkey and Norway. *Journal of Risk Research*, *15*(7), 787–800.

Thomas, F. D., Blomberg, R. D., Peck, R. C., Cosgrove, L. A., & Salzberg, P. M. (2008). Evaluation of a high visibility enforcement project focused on passenger vehicles interacting with commercial vehicles. *Journal of Safety Research*, *39*(5), 459–468.

Trafik Kaza ve Denetim İstatistikleri. (2019, August). Retrieved from https://www.pa.edu.tr//Upload/editor/files/Trafik_Kaza_ve_Denetim_İstatistikleri.pdf

Veevers, J. (1982). Women in the driver's seat: Trends in sex differences in driving and death. *Population Research and Policy Review*, *1*(2), 171–182.

World Health Organization. (2015). *Global status report on road safety 2015*. World Health Organization: Geneva.