THE RELATIONSHIP BETWEEN TRAFFIC CLIMATE AND DRIVER BEHAVIORS: EXPLICIT AND IMPLICIT MEASURES WITH TURKISH AND CHINESE SAMPLES

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ABSTRACT

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Traffic fatality rates and driver behaviors show regional differences. It is assumed that perceived traffic climate in a given context are closely related to driver behaviors. The first part of the present study aims to test this assumption cross-culturally. Specifically, in this part, the aim was to investigate the relationships between traffic climate and driver behaviors in Turkey and China. The results revealed that this assumption was supported partially. Perceiving traffic climate as externally demanding was positively related with aberrant driver behaviors and negatively related with positive driver behaviors in both Turkey and China. Functionality was negatively related to violations in Turkey and internal

requirements were negatively related to violations in China. The relationships between traffic climate and driving behaviors show some cultural differences in addition to cultural similarities. In the second part of the study, both implicit and explicit attitudes towards traffic climate and their relationships with self-reported driver behaviors and outcomes of simulated driving were investigated in a young Turkish driver sample. Implicit attitudes towards traffic climate were tested for the first time in the literature. According to the results, implicit attitudes towards functionality was positively related to positive driver behaviors and negatively related to variance in lane positioning. Based on the findings, drivers might have different implicit and explicit attitudes towards traffic climate. The differences in experience level between the samples may be the reason why study 2 did not replicate the results of study 1.

Keywords: Traffic Climate, Driver Behaviors, Implicit Attitudes, Explicit Attitudes, Driving Simulator

ÖZ

TRAFİK İKLİMİ VE SÜRÜCÜ DAVRANIŞLARI ARASINDAKİ İLİŞKİLER: TÜRKİYE VE ÇİN ÖRNEKLEMLERİNDE ÖRTÜK VE AÇIK ÖLÇÜM YÖNTEMLERİ

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Trafik ölüm oranları ve sürücü davranışları bölgesel farklılıklar göstermektedir. Belirli bir bölgede algılanan trafik ikliminin sürücü davranışları ile yakından ilgili olduğu düşünülmektedir. Bu çalışmanın ilk kısmında, bahsedilen varsayımın kültürler arası test edilmesi hedeflenmiştir. Daha belirgin olarak, ilk kısımda, trafik iklimi ve sürücü davranışları arasındaki ilişkinin Türkiye'de ve Çin'de araştırılması amaçlanmıştır. Bu ilişki kültürler arası test edilmiş ve kısmen desteklenmiştir. Trafik ikliminin dışsal duygu talepleri alt boyutu, hem Türkiye'de hem de Çin'de sapkın sürücü davranışları ile pozitif, pozitif sürücü davranışları ile ise negatif ilişki göstermiştir. Türkiye'de işlevsellik ihlaller ile negatif yönde ilişkiliyken, Çin'de ise

içsel gereksinimler ihllaler ile negatif ilişkilidir. Trafik iklimi ve sürücü davranışları arasındaki ilişkiler, kültürler arası farklılıkların yanı sıra, kültürler arası benzerliklere de işaret etmektedir. Çalışmanın ikinci kısmında, trafik iklimine yönelik hem örtük hem de açık tutumlar ve onların beyana dayalı ve simülatördeki sürücü davranışları ile aralarındaki ilişkiler Türk genç sürücüler arasında incelenmiştir. Trafik iklimine yönelik örtük tutumlar literatürde ilk defa test edilmiştir. Sonuçlara göre, işlevselliğe yönelik tutumlar pozitif sürücü davranışları ile pozitif, şerit değişikliği ile negatif ilişki göstermektedir. Bulgulara göre, sürücülerin trafik iklimine yönelik örtük ve açık tutumları farklılık gösterebilirler. Örneklemler arasındaki deneyim seviyesi farkına bağlı olarak, çalışmanın birinci kısmında bulunan bazı ilişkiler çalışmanın ikinci kısmında bulunamamış olabilir.

Anahtar Kelimeler: Trafik İklimi, Sürücü Davraşları, Örtük Tutumlar, Açık Tutumlar, Sürüş Simülatörü

To Mom, Dad, and Ulaş with love...

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CHAPTER 1

INTRODUCTION

According to World Health Organization's (WHO) estimations approximately 1.25 million people die due to road traffic injuries and road traffic accidents cost approximately 3% of GDP for governments. Globally, road traffic injuries are the ninth leading causes of fatalities and estimated that it will be the seventh leading cause in 2030 (WHO, 2015). Road traffic fatalities show regional differences and majority of the fatalities occur in low and middle-income countries (WHO, 2015). To illustrate, road traffic fatality rates in low and middle-income countries are twice as high as in high-income countries and constitute 90% of global road traffic fatalities, although the number of vehicles registered in these countries accounts for only 54% of the registered vehicles in the world (WHO, 2015).

As presented in Figure 1, road traffic injuries and fatalities show differences among countries and regions (WHO, 2013). Similarly, driver behaviors also show regional differences (e.g. Lajunen, Parker, & Summala, 2004; Özkan, Lajunen, Chliaoutakis, Parker, & Summala, 2006; Warner, Özkan, Lajunen, & Tzamalouka, 2011). Traffic environment of a country that a driver mostly drives might influence a driver's behaviors in traffic context. The possible explanation for the differences in driver behaviors might be about the differences in perceived traffic climate of their countries' traffic context.

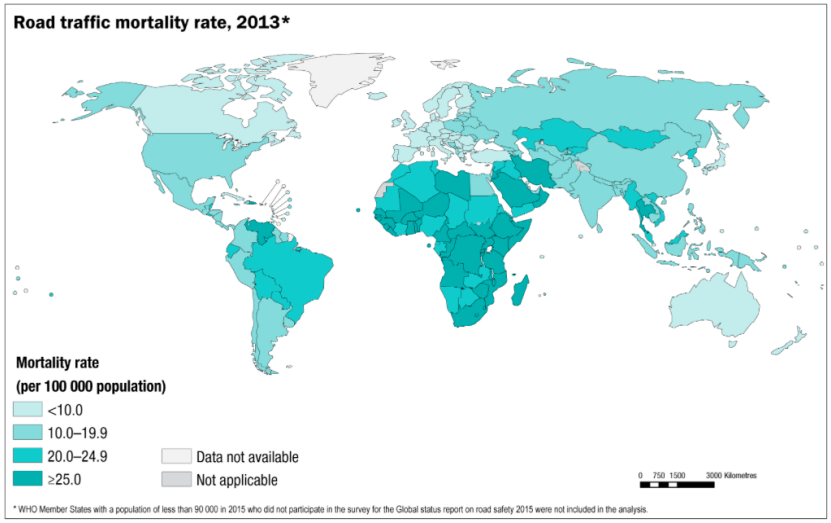


Figure 1. World map in road traffic injury mortality rates (WHO, 2016)

Undesired outcomes of road safety are global problems. There are numerous attempts to improve road safety, including interventions, education programs, campaigns, and enforcements. The stated attempts have been effective in increasing road traffic safety, however, the inclusion of traffic safety culture and traffic safety climate into agenda is a need to improve road safety (Gehlert, Hagemeister, & Özkan, 2014). Traffic culture is described as "the sum of all external factors and practices for mainly the goals of mobility and safety to cope with internal factors of traffic" (Özkan & Lajunen, 2011). In order to understand traffic culture, Özkan and Lajunen (2015) developed a comprehensive model, namely General Traffic Safety Culture System, (G-TraSaCu-S), with both vertical and horizontal levels, and including all road user types. The aim of the developed framework was to show possible main reasons behind differences among countries for road traffic safety. Additionally, the model aims to bring a new perspective to road traffic safety to decrease the number of road traffic accidents, injuries, and fatalities.

In order to "fight" with road traffic accidents, before G-TraSaCu-S, Özkan and Lajunen (2011) proposed a framework by merging the person (i.e. the role of behavioral factors in road traffic accidents) and environment factors (i.e. the structure of the complex multilevel sociocultural and technical environment of traffic, its goals and mechanisms). The structure of the multilevel sociocultural and

technical environment of traffic is described under four levels: micro, meso, macro, and magna. The micro level (i.e. level 1) is about individual level characteristics of behavioral factors in driving. The individual level characteristics are listed as age, sex, and cognitive process and/or biases. It is assumed that the listed variables have close relationships with driver behaviors, performance, and accident involvement (Elander, West, & French, 1993; Groeger, 2000; Naaten & Summala, 1976).

Meso level (i.e. level 2) is about the organizational/company and group/community level factors. Hence, in this level, the main focus is on professional drivers. Driving can be considered as a self-paced task; however professional drivers' driving is less self-paced compared to non-professional drivers' driving (Caird & Kline, 2004). In other words, non-professional drivers are able to choose when to travel, mode of transportation, and their speed. However, professional drivers might not be able to choose the stated factors due to their task demands. Additionally, the company's organizational culture and/or climate can be regarded as the factors that affect professional drivers' driving (Caird & Kline, 2004). Organizational culture is defined as "a summary of molar perceptions that employees share about their work environments" (Zohar, 1980). Findings suggested that organizational factors are related with professional drivers' driving behaviors and performance, and accident involvement (Öz, Özkan, & Lajunen, 2010; 2013).

Macro level (i.e. level 3) is about national level factors. Governance quality, Hofstede's cultural dimensions, and Schwartz's values can be considered as national level factors. Two countries with approximately same weather climate might have different safety regulations and practices (e.g. Russia and Finland) (Leviäkangas, 1998), which are important variables that shape driver behaviors. These traffic safety regulations and practices can be a reflection of governance quality of a country. Magna level (i.e. level 4) is about ecocultural sociopolitical level factors. In magna level, the predominant factors that are about countries' origins, such as economy, national culture, and demography are evaluated (Özkan & Lajunen, 2011).

Later, in order to clarify the logic of the previous framework, Özkan and Lajunen (2015) developed the General Traffic Safety Culture System (G-TraSaCu-S) by

merging vertical levels and horizontal levels (See Figure 2). Traffic system is assumed as the sum of all sub-systems as a whole and the sub-systems are exemplified as internal factors, goals/aims, practices/artifacts, outputs/outcomes, origins/distal factors, cultural components, and outside influences and feedback/feed forward loops at micro, meso, macro and magna levels (Özkan & Lajunen 2015). "The whole is greater than the sum of its parts"; meaning that traffic climate is the perception of the whole traffic system. In G-TraSaCu-S, the cultural components are considered as societal norms and value systems that are shared by all road users and form the center of the suggested traffic system in all levels (i.e. micro, meso, macro, and magna levels) (Özkan & Lajunen, 2015).

There are also other vertical levels, namely original/distal factors, proximal factors, outcomes, and main goals. Original factors level is the first vertical level. In micro level, the measures can be age, sex, personality, and motives. In meso level, the measures can be community, city, and organization type. In macro level, the measures can be traffic regulations, public awareness, and political climate. In magna level, the measures can be population, climate, economy, history, and geography (Özkan & Lajunen, 2015).

The second vertical level is cultural components, which are mainly about values and norms. In micro level, the measures can be general individual values and norms. In meso level, safety dimensions and ladders of an organization can be the measures. In macro level, attitudes and perceptions of road users towards country traffic can be the measures. In magna level, national cultures can be used as measures (Özkan & Lajunen, 2015).

The third vertical level is proximal factors. In the micro level, the measures can be evaluations and daily activities of road users. In the meso level, measurements can be evaluation and monitoring, time schedules, pricing and planning of organizations. In the macro level, the measures can be level of enforcements and driver behaviors. The example measures for magna level can be level of enforcements and governance (Özkan & Lajunen, 2015).

The fourth vertical level is outcomes. For the micro level, the measures can be the number of injuries, accidents and offences in individual level. For the meso level, the measures can be the number of fatalities, injures and accidents per city or organization. For the macro level, the measures can be number of fatalities, injuries, and accidents per exposure or population. The measures for magna level can be aggregated number of fatalities and economic costs (Özkan & Lajunen, 2015). Overall, the outcomes for all levels are listed as number of accidents, injuries and fatalities. However, it should be noted the data has different scales for each level. For instance, for micro level outcomes, a driver's numbers of injuries are included, whereas in magna level, number of injuries that occurred in a country is included.

The fifth vertical level is main goals. For micro level, main goals can be speed, fun, and excitement in individual level. For meso level, the measures can be profit and reputation of organizations. For macro level, the main goals can be life quality and well-being. The main goals can be accessibility, mobility, and safety for magna level (Özkan & Lajunen, 2015).

In the present study, the relationships between cultural components and proximal factors in macro level were investigated. In macro level, perceived traffic climate was included as the indicator for cultural components, and driver behaviors were included as the indicator for proximal factors.

1.1. Cultural components: Traffic Climate

In order to decrease the number of road traffic fatalities, injuries, and accidents, there are attempts to improve and/or develop technology, enforcement strategies, and infrastructures. Although the main aim is to decrease the undesired outcomes in traffic context, the number of road traffic fatalities, injuries, and accidents show that the stated attempts might not be effective enough to reach the road traffic safety aims (Ward, Linkenbach, Keller, & Otto, 2010). By adding traffic climate perspective, human factor will become a part of the road traffic system and attempts to improve road safety might become more effective.

The research on traffic culture and traffic climate is limited. Hence, it might be a good starting point to define the differences between culture and climate from organizational safety culture and climate literature. Although organizational safety culture and organizational safety climate have been used interchangeably in some studies, the reviews on safety culture and safety climate highlight the differences between the two terms (Guldenmund, 2000; Wiegmann, von Thaden, & Gibbons, 2002). There are numerous definitions for safety culture and Wiegmann et al. (2002) summarized the communalities in seven items. First item suggests safety culture is defined at group level or higher and is mainly about the shared values between members of a group and/or an organization. The second item suggests that safety culture is about the formal safety rules in an organization. Also, safety culture is closely related to management and supervisory systems of an organization. The third item suggests that everyone from every level of an organization show contributions to safety culture. The fourth item suggests safety culture and people's behaviors at work have a close relationship. The fifth item suggests safety culture is associated with the contingency between reward systems and safety performance. The sixth item suggests an organization's level of willingness to develop and learn from undesired outcomes (e.g. errors, incidents, and accidents) provides information about safety culture of that organization. The last item suggests safety culture shows resistant to change. Based on these communalities, Wiegmann et al. (2002) defined safety culture as:

> "Safety culture is the enduring value and priority placed on worker and public safety by everyone in every group at every level of an organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety, act to preserve, enhance and communicate safety concerns, strive to actively learn, adapt and modify (both individual and organizational) behavior based on lessons learned from mistakes, and be rewarded in a manner consistent with these values."

Even there are similarities between the definitions of safety culture and climate; there are some communalities within the different definitions of safety climate that suggest safety climate is different from safety culture. These communalities are

described in three items (Weigmann et al., 2002). The first item suggests safety climate is about the perceptions of the level of safety at a given time. The second item suggests intangible issues (e.g. situational and environmental factors) are closely related with safety climate. The last item suggests that, safety climate is a temporal phenomenon. In other words, safety climate is a snapshot of safety culture. It has an unstable nature and subject to change compared to safety culture.

Similar to the communalities and differences between (organizational) safety culture and (organizational) safety climate, the same distinction can be made for traffic (safety) culture and traffic (safety) climate. Traffic culture is described as "the sum of all factors that affect skills, attitudes, and behaviors of drivers as well as vehicles and infrastructure" (Leviäkangas, 1998). Formal and informal rules, norms and values shape traffic culture and traffic culture influences the acceptable and necessary road user behaviors and required driver skills (Özkan & Lajunen, unpublished). In the literature, traffic culture and traffic climate are used interchangeably although they are different terms. Özkan and Lajunen (2011) defined traffic climate as "the road users' (e.g. drivers) attitudes and perceptions of the traffic of the context (e.g. country) at a given point in time". The traffic context includes variables as practices, policies, procedures, routines, and sanctions. Hence, it may show differences across countries (Özkan & Lajunen, unpublished). This difference might be helpful to explain the differences in road traffic outcomes between countries.

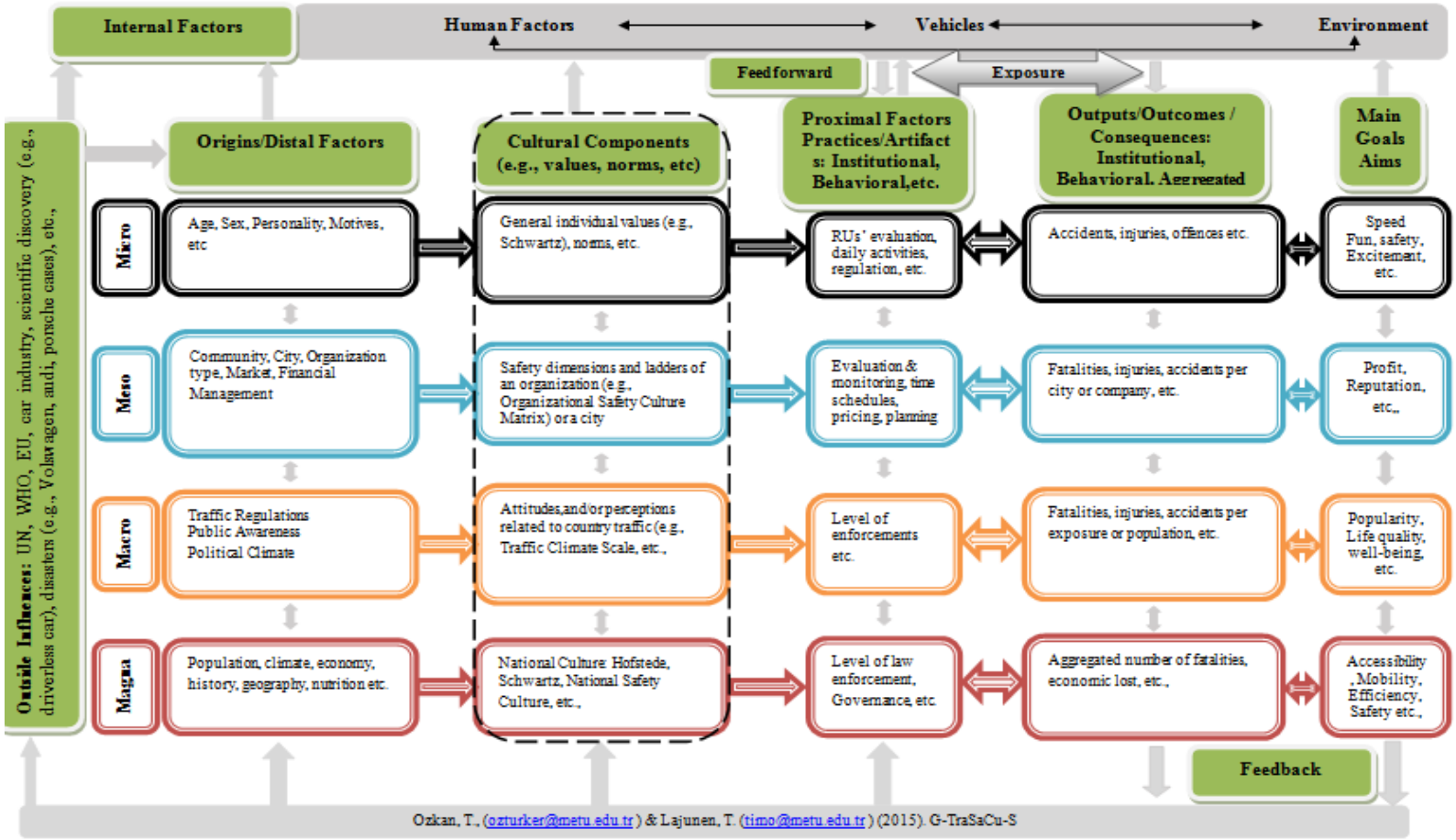


Figure 2. G-TraSaCu-S: The combination of Horizontal and Vertical Models with a cultural approach

Based on the communalities and differences between safety culture and safety climate definitions, Weignmann et al. (2002) recommended that safety climate is a snapshot of safety culture. The same metaphor can also be adapted to traffic (safety) culture and traffic (safety) climate. Traffic culture is defined as "the product of exposure and interaction of road users and the set of formal and informal rules, norms, basic assumptions, attitudes, values, habits, and perceptions in relation to safety and/or to conditions considered risky, dangerous, or injuries" (Özkan & Lajunen, 2011). Different from traffic culture, traffic climate is defined as "the road users' (e.g., drivers') attitudes and perceptions of the traffic in a context (e.g., country) at a given point in time" (Özkan & Lajunen, unpublished) and their description is also parallel with the snapshot metaphor.

Traffic climate includes road users' attitudes towards traffic context. Ajzen (2001) defined attitude as "a summary evaluation of an entity with some degree of favor or disfavor". Attitudes are important to organize and interpret new information and to express core values and beliefs about the subject. Attitude has three components: cognitive, affective, and behavioral. Cognitive component includes people's thoughts and ideas. The affective component includes people's feelings and emotions. Behavioral component includes overt behaviors and intentions. Carr, Schmidt, Ford, and DeShon (2003) developed a taxonomy to investigate organizational climate attitudes and suggested three facets: affective, cognitive, and instrumental. The affective facet includes people involvement and interpersonal/social relations in an organization. The cognitive facet includes psychological involvement, self-knowledge and development of members in an organization. The instrumental facet is about task involvement and work processes of members in an organization. The three components of attitudes and three facets of organizational climate are similar and argued that stated three-dimensional structure might be adjustable to traffic climate (Gehlert et al., 2014).

Attitudes can operate at two levels, which are explicit and implicit. Explicit attitudes include deliberate processes. They give information abot conscious evaluations about the given object and they are reportable. Since explicit attitudes include

conscious judgments, they are open to biases (Hoffman, Gawronski, Gschwendner, Le, & Schmitt, 2005). On the other hand, implicit attitudes are about unconscious representations of the given objects (Greenwald & Banaji, 1995). In implicit measures, participants respond to questions based on automatic association between their minds and the attitude object (Rudman, 2011). Due to automatic nature of implicit attitudes, people do not have control over them and it is assumed that they are lack of biases (Gawronski, LeBel, & Peters, 2007).

To understand how road users conceptualize their traffic climate and to measure their explicit attitudes towards traffic climate, the Traffic Climate Scale (TCS) was developed. The TCS measures road users' perceptions of the given context's traffic environment (Özkan & Lajunen, unpublished). The Multidimensional Scaling results showed that the TCS has three main dimensions: external affective demands, functionality, and internal requirements. The TCS was translated into German and Chinese and factor analyses results also suggested the same three dimensions (Chu, Wu, Atombo, Zhang, & Özkan, under review; Gehlert et al., 2014). External affective demands dimension is about emotional engagement that is required by road users. Functionality dimension includes characteristics of safety and mobility and requirements for a functional traffic system. Internal requirements include skills and abilities of road users that are required while participating in traffic (Gehlert et al., 2014). The three dimensions of the traffic climate showed similarities with the three-dimensional structure of attitudes and organizational climate (Gehlert et al., 2014). The external affective demands are similar with affective dimension of attitudes and organizational climate. Functionality dimension is similar with behavioral dimension of attitudes and instrumental dimension of organizational climate. Lastly, the internal requirements dimension is similar with cognitive dimensions of attitudes and organizational climate.

It is assumed that how drivers perceive traffic context might shape their driving behaviors. Similarity principle and frequency principle can be useful to explain the relationships between traffic climate and driver behaviors (Özkan & Lajunen, unpublished). Based on the similarity principle, the representations of traffic context

in drivers' minds and their driving styles might show overlaps. For instance, as drivers perceive traffic context externally affective demanding, they might show more violations because of similarity. If drivers perceive traffic context as requiring highly driving skills, they might drive accordingly and this accordance might be explained with confirmation bias (Özkan & Lajunen, unpublished).

1.2. Driver Behaviors

Road traffic accidents are preventable and the majority of the reasons behind them might be attributed to human error, which is considered as a sole or a contributory factor for road traffic accidents (Lewin, 1982). Driving skill/performance and driving style/behavior are two separate components of human factors that affect drivers' behaviors in traffic (Elander et al., 1993; Evans, 1991). The way drivers prefer to drive is called driver behavior. It can be described as what drivers usually "do" while driving. Information processing, motor, and safety skills represent driver performance, which reflects what drivers "can" do. Driving performance can be improved with practice and training (Elander et al., 1993). Since the current study aims to investigate the relationship between cultural components and proximal factors, the focus is on driver behaviors (i.e. proximal factors).

There have been different self-report instruments to measure driver behaviors. The Driver Behavior Questionnaire (DBQ) is the most frequently used instrument to measure aberrant driver behaviors (de Winter & Dodou, 2010). The DBQ is based on theoretical taxonomy of aberrant driver behaviors that include errors and violations (Reason, Manstead, Stradling, Baxter, & Campbell, 1990). Errors and violations have different psychological origins. They are distinct from each other in terms of intention (Reason et al., 1990). Errors are defined as "the failure of planned actions to achieve their intended consequences", whereas violations are defined as "deliberate deviations from those practices believed necessary to maintain the safe operation of a potentially hazardous system" (Reason et al., 1990). Errors are unintentional driver behaviors, whereas violations are intentional driver behaviors. With addition of new items about violations, the DBQ was extended. The new

version of the DBQ classifies violations as ordinary and aggressive violations (Lawton, Parker, Manstead, & Stradling, 1997). Ordinary violations are violations without any aggressive motivation (e.g. speeding). Aggressive violations are about overtly aggressive acts (e.g. sounding horn to indicate your annoyance).

Apart from aberrant driver behaviors, there are other behaviors, which cannot be categorized as aberrant due to their nature. Özkan and Lajunen (2005) suggested that there are drivers who try to help and be polite to other road users in traffic. These positive behaviors can be with or without safety concerns. These positive driver behaviors might be passive (e.g., avoid causing delays or annoyance to other drivers) and active behaviors (e.g., moving to the right side of the lane to ease overtaking, thanking by hand gesture) (Özkan & Lajunen, 2005). The positive driver behaviors do not base on formal rules and/or regulations.

The DBQ has been translated into different languages and as de Winter and Dodou (2010) declared, there are, at least, 174 studies used the original DBQ or different versions. The cross-cultural studies supported the distinction between errors and violations (e.g. Lajunen et al., 2004; Özkan et al., 2006; Warner et al., 2011), also suggested by Reason et al. (1990) in their first study. Although the most stable factors are regarded as errors and violations, the factor structure of the DBQ showed some differences among studies (Davey, Wishart, Freeman, & Watson, 2007; Özkan et al., 2006; Sullman, Meadows, & Pajo, 2002; Xie & Parker, 2002). The possible underlying reason of different factor structures across cultures might be about the differences in traffic contexts and how road users perceive the traffic environment.

1.3. Traffic Climate and Driver Behaviors

In the literature, studies mainly focused on the cross-cultural differences in driver behaviors and accidents. For instance, Özkan et al. (2006) investigated the cross-cultural differences in driving behaviors among six countries (i.e. Finland, Great Britain, Greece, Iran, the Netherlands, and Turkey). Drivers from Great Britain, the Netherlands, Finland and Iran reported higher ordinary violations than drivers from Turkey and Greece, whereas drivers from Greece, Turkey and Iran reported higher

aggressive violations and errors than drivers from Finland, Great Britain and the Netherlands. Driver behaviors also mediated the relationship between culture/country and accidents. The relationships were stronger for aggressive violations and errors. Although the regional differences are well known, there are limited numbers of studies that have focused possible underlying reasons of these differences. One of the reasons behind this variance might be perceived traffic climate.

The number of studies investigating the relationships between traffic climate and driver behaviors is limited (Chu et al., under review; Gehlert etl al., 2014; Zhang, Ge, Qu, Zhang, & Sun, 2018). The results of the study conducted in Germany (Gehlert et al., 2014) showed that internal requirements had significant negative relationship with accidents, whereas external affective demands and functionality had significant positive correlations with accidents. The relation between red-light running fines and traffic climate dimensions was not significant. Drivers who perceived their traffic context as highly external affective demanding described other drivers' driving styles as more unsafe, assertive, tense, sportive and against traffic rules, whereas they reported their own driving style as safe and relaxed. It should be noted that, the relationships were very weak among variables. Drivers who perceived the traffic context as highly internal demanding reported their own driving styles as yielding, calm, safe and following traffic rules. On the other hand, the relationship was not statistically significant for internal requirements and others' driving styles. Drivers who reported their traffic context as functional perceived other drivers' driving styles as safe, relaxed, calm, yielding and in line with traffic rules. Contrary to internal requirements, the relationship between functionality and drivers' own driving styles were not significant. As drivers perceived their traffic context as less internal demanding (i.e. internal requirements) and more functional, drivers were more likely to show traffic violations. In other words, in German sample, as the traffic climate was perceived more positive, more aberrant behaviors were reported.

The relationship between traffic climate, driver behaviors and accident involvement were studied in China (Chu et al., under review). Internal requirements and functionality dimensions had significant negative relationships with aberrant driver behaviors. Additionally, they also found positive relationships between internal requirements, functionality and positive driver behaviors. The relationships between external affective demands dimension and aberrant driver behaviors suggested that, as traffic context was perceived more emotionally demanding, drivers were more likely to report violations, which in turn increased the risks for accident involvement.

Zhang et al. (2018) also examined the same relationship in China, and suggested opposite findings for external affective demands and functionality. External affective demands were negatively, functionality, and internal requirements were positively related to drink-driving behavior. Interestingly, functionality was also related to penalty points positively. Internal requirements were also positively correlated with dangerous driving, aggressive driving, and risky driving. The results suggested that, less externally demanding and less internally demanding and high functional traffic environment was related to more unsafe behaviors.

When the studies from Germany and China were compared, they have both similarities and differences for the relationship between dimensions of TCS and aberrant driver behaviors. In both countries, as traffic climate was perceived more less internally demanding, drivers were more likely to show violations. The relationships between external affective demands and functionality showed contradictory findings. It can be suggested that, the difference might be both due to the factor structures of the scales that were used in studies, and also the cross-cultural differences.

Attitudes operate at two levels, which are explicit attitudes and implicit attitudes. In the previous studies, Traffic Climate Scale was used to measure explicit attitudes towards traffic climate and significant relationships were reported with driver behaviors. However, considering the social desirability in self-report instruments, it

is unknown that whether the results yielded significant relationships due to use of explicit attitudes or not. Hence, implicit attitudes towards traffic climate and their relationships can be investigated to understand the relationships between explicit attitudes and implicit attitudes towards traffic climate and driver behaviors. Based on the findings, new intervention strategies might be developed to change road users' implicit attitudes.

1.4. Aim of the Study

The present study aimed to investigate the relationships between explicitt and implicit attitudes towards traffic climate and driver behaviors. The study was consisted of two parts. In the first study, two countries, Turkey and China were compared in terms of perceived traffic climate and driver behaviors by using self-reports. This study was the first one to make cross-cultural comparisons for traffic climate. In the second part, the same relationships were examined among young Turkish drivers. For the second study, in addition to self-report instruments, implicit association test and simulated driving were also used. Implicit attitudes towards traffic climate were investigated for the first time in the literature.

CHAPTER 2

STUDY 1: TRAFFIC CLIMATE AND DRIVER BEHAVIORS IN TURKEY AND CHINA

2.1. Introduction

According to the WHO (2015), there are regional differences in road traffic fatalities. Similarly, there are differences in driver behaviors among cultures. For instance, Özkan et al. (2006) investigated the cross-cultural differences in driving behaviors among six countries (i.e. Finland, Great Britain, Greece, Iran, the Netherlands, and Turkey). Drivers from Great Britain, the Netherlands, Finland and Iran reported higher ordinary violations than drivers from Turkey and Greece, whereas drivers from Greece, Turkey and Iran reported higher aggressive violations and errors than drivers from Finland, Great Britain and the Netherlands. The mediating role of driver behaviors on the relationship culture/country and accidents were also examined. Driver behaviors (especially aggressive violations and errors) mediated the stated relationship. Although the regional differences are well known (e.g. Lajunen et al., 2004; Özkan et al., 2006; Warner et al., 2011), there are limited numbers of studies that have focused possible underlying reasons of these differences. One of the reasons behind this variance might be traffic climate.

Traffic climate can be described as the the road users' (e.g., drivers') attitudes and perceptions of the traffic in a context (e.g., country) at a given point in time (Özkan & Lajunen, unpublished). It is consisted of three dimensions: external affective demands, functionality, and internal requirements. These three dimensions might affect driver behaviors in different ways. For instance, if traffic environment is perceived as externally demanding (e.g. competitive), the frequency of violations might increase (Chu et al., under review), whereas if it is perceived as requiring high skills (internal requirements), the frequency of errors and violations might show

decrease (Chu et al., under review; Gehlert et al., 2014). In other words, safe-driving behaviors might increase when traffic is perceived as high on internal requirements. The perceived traffic climate might buffer or exacerbate risky driver behaviors. To illustrate, functional traffic environment might cause more risky driving behaviors in some cultures, whereas it might cause safer driving behaviors in another culture.

Özkan and Lajunen (2011) developed a new framework by merging the person and environment factors to understand the possible underlying reasons in traffic accidents. Later, they developed the G-TraSaCu-S model. The model includes four horizontal levels, namely micro, meso, macro and magna levels. The micro level includes individual factors. The meso level includes the organizational factors. The macro level is about the country/national level factors. The magna level is about the global and sociopolitical level factors. In G-TraSaCu-S, the main vertical level is considered as cultural components. Cultural components level is the core of the system and includes societal norms and value systems that are shared by road users (see Figure 2) (i.e. micro, meso, macro, and magna levels) (Özkan & Lajunen, 2015).

In the present part of the study, the relationship between cultural components (i.e. traffic climate) and proximal factors (i.e. driver behaviors) are examined in macro level for Turkey and China. The income levels of both countries are categorized as countries with middle-income level (WHO, 2015). Since Turkey and China are not similar in their populations, the estimated road fatality rate per 100 000 population is considered as the criteria. The countries were selected based on their traffic fatality rates. Turkey has a high rate, which is estimated as 8.9, and China has a higher estimated rate as 18.8 per 100 000 population (WHO, 2015). To the author's knowledge, there are no studies in the literature investigating the differences between cultural components (i.e. traffic climate) and proximal factors (i.e. driver behaviors) across Turkey and China.

2.1.1. Cultural Variables

China and Turkey have cultural differences based on both Hofstede's cultural dimensions and Schwartz's value dimensions. Hofstede (2001) defined culture as "the collective programming of the mind that distinguishes the members of one group or category of people from another" and identified five dimensions: power distance, uncertainty avoidance, individualism versus collectivism, masculinity versus femininity, and long-term versus short-term orientation. Power distance is about inequality among people in a culture. Individualism versus collectivism is about how people in a society define their self-image (I versus we). Masculinity versus femininity is about the division of emotional roles between genders. Uncertainty avoidance describes the level of comfort with uncertainty and ambiguity. Lastly, short-term versus long-term orientation refers to people's focus on time-orientation (e.g. present versus future).

Schwartz claimed three concerns that societies have to deal with and seven value dimensions based on these three concerns were suggested (Schwartz, 2006). The first concern is ''to what extent persons are either autonomous or embedded in their group'', and the three value dimensions are suggested based on this concern: embeddedness, intellectual autonomy and affective autonomy. In cultures with high embeddedness, people give importance to their social connections. People identify themselves with their groups. Societies with high intellectual autonomy encourage their members to share their own ideas independently. Cultures with high affective autonomy support their members to have experiences, which make them feel good. The second concern is to "guarantee that people behave in a responsible manner that preserves the social fabric". The second concern is represented with two value dimensions: hierarchy and egalitarianism. In societies with high hierarchical orientation, people have different roles based on their positions. In egalitarian societies, all members are perceived equal and they care about others' welfare. The third concern is about "the relationship between an individual and the natural and social environment". It is related to two value dimensions: harmony and mastery. In high harmony societies, people do not manipulate the natural and social environment

but rather they try to adjust themselves. In high mastery societies, people give importance to manipulating the natural and social environment to achieve “active self-assertion”.

2.1.2. Comparisons of Turkey and China

According to Hofstede’s scores (Hofstede, 2001; see Figure 1), the world average for power distance is 59.33. China has a score of 80 for power distance, whereas Turkey’s score is 66. Compared to the world average, both cultures are high in power distance. It is suggested that, in China, inequalities among people are acceptable and in Turkey, the culture is described as hierarchical. For the individualism versus collectivism dimension, the world average is 45.17, and both China and Turkey are more close to collectivistic side. Based on country comparisons, China is considered as a highly collectivist culture with a score of 20, and Turkey is regarded as a medium collectivist society with a score of 37. On masculinity versus femininity dimension, the world average is reported as 49.27. China is considered as a masculine society with a score of 66, which is higher than the world average, whereas Turkey is considered as a feminine society with a score of 45, which is lower than the world average. On uncertainty avoidance dimension, the world average is reported as 67.64. Turkey has a high score, which is 85, meaning that laws and rules are needed, whereas China has a score of 30, meaning that people in China are comfortable with ambiguity. Lastly, on long-term versus short-term orientation dimension, the world average is reported as 45.49. Turkey has a score 46, meaning being in the middle and close to the world average, whereas China has a score of 87 meaning that society has a pragmatic culture, focusing on long-term consequences.

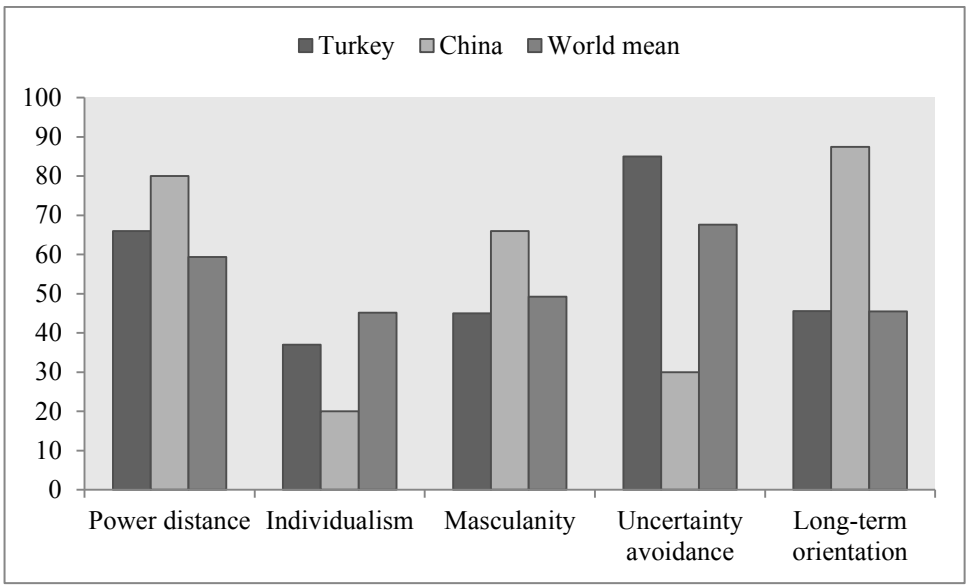


Figure 3. Turkey, China and world mean comparisons on Hofstede's cultural dimensions

The first concern of Schwartz is about ''to what extent persons are either autonomous or embedded in their group'' and two countries are compared based on embeddedness, intellectual autonomy and affective autonomy. Turkey and China has similar scores for all three values. For embeddedness, the world average is 3.78, and both Turkey and China have closer scores to the world average. China has a score of 3.74 and Turkey has a score of 3.77. Both cultures are more close to being identified with the group. For affective autonomy, the world average is reported as 3.46. China has a score of 3.3 and Turkey has a score of 3.37, which are also close to the world average. In both cultures, people are encouraged to have positive experience in similar levels. For intellectual autonomy, the world average is reported is 4.33. China has a score of 4.18, which is lower than the world's mean. Turkey has a score of 4.45; meaning that, in Turkey, people are more encouraged to express their own ideas independently than China.

The second concern is about "guarantee that people behave in a responsible manner that preserves the social fabric" and two countries are compared based on egalitarianism and hierarchy. For egalitarianism, the world average is reported as

4.69. China has a lower score and Turkey has a higher score than the world average. China has a score of 4.23 and Turkey has a score of 4.77; meaning that in Turkey, people are more likely to be encouraged to recognize people as moral equals and to internalize a commitment for cooperation. For hierarchy, the world average is reported as 2.34 and both Turkey and China has higher scores than the mean. China has a score of 3.49 and Turkey has a score of 2.97. The difference might mean that in China, the distribution of power, roles and recourses are more unequal than Turkey.

The third concern is about "to regulate people's treatment of human and natural resources". Two countries are compared based on harmony and mastery. For harmony, the world average is reported as 4.02. Turkey has a higher score than the world's mean, whereas China has a lower score than the world's mean. China has a score of 3.78 and Turkey has a score of 4.23. It might be suggested that in Turkey, people try to accept rather than to change and fit into the social and natural world more than China. For mastery, the world average is reported as 3.94 and both countries have higher scores than the mean. China has a score of 4.41 and Turkey has a score of 3.98; meaning that in China, society is encouraged to change and master the natural and social environment to attain goals more than Turkey.

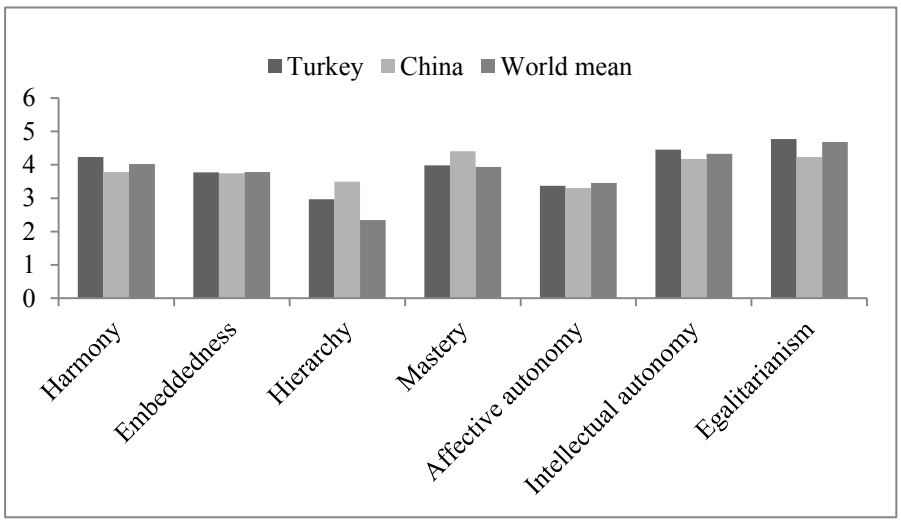


Figure 4. Turkey, China, and world mean comparison on Schwartz's values

Based on both Hofstede's cultural dimensions and Schwartz's value dimensions, Turkey and China has some similarities; however they show mostly differences. To summarize, based on Hofstede's cultural dimensions (Hofstede, 2001), there are more inequalities in China and people prefer to identify themselves as "we" rather than "I". Turkey is considered as a feminine country, meaning emotional roles are shared equally between genders. Turkey needs laws and rules to overcome ambiguity. China focuses on long-term consequences rather than short-term consequences. Based on Schwartz's value dimensions, in Turkey, people feel more free to share their ideas independently and recognize other people as moral equals. In China, there are more inequalities in power and roles (Schwartz, 2006). According to the literature, not all the cultural components have close relationships with traffic related variables. Hence, not all the differences might lead to differences between two countries (i.e. Turkey and China). The details of the relationship between cultural components and traffic related variables were presented in the light of literature.

2.1.3. Cultural Component and Traffic Related Variables

In the literature, mainly the relationships between cultural components and traffic related variables are studied in magna level (Gaygısız, 2010; Özkan & Lajunen, 2007; Solmazer et al; 2016; Üzümcüoğlu et al., under review). In magna level, cultural components are usually measured with Hofstede's cultural dimensions and Schwartz's value dimensions. In a related study, Özkan and Lajunen (2007) investigated the relationship between cultural components (i.e. Hofstede's cultural dimensions and Schwartz's value dimensions) and outcomes (i.e. traffic fatality rates). Among Hofstede's cultural dimensions, uncertainty avoidance and power distance were positively and individualism was negatively related to traffic fatality rates. Among Schwartz's value dimensions, only harmony had significant positive correlation with traffic fatality rates.

In another study, Gaygısız (2010) examined the relationship between cultural components (i.e. Hofstede's cultural dimensions and Schwartz's value dimensions),

proximal factors (i.e. rule of law) and outcomes (i.e. traffic fatalities). Gaygısız (2010) used a larger sample than Özkan and Lajunen (2007). Rule of law is defined as ‘‘capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence” (Kaufmann, Kraay, & Mastruzzi, 2007). Among Hofstede’s dimensions, power distance and uncertainty avoidance had significant negative correlations with rule of law, whereas individualism had significant positive correlation with rule of law. Among Schwartz’s value dimensions, embeddedness and hierarchy were significantly correlated with rule of law, whereas affective autonomy, intellectual autonomy, and egalitarianism were positively correlated with rule of law. When the relationship between cultural variables and traffic fatality rates was investigated, among Hofstede’s dimensions, only power distance had a significant positive relationship with traffic fatality rates. Among Schwartz’s value dimensions, embeddedness, hierarchy and mastery had significant positive relationships, and intellectual autonomy and egalitarianism had significant negative relationships with traffic fatality rates.

Similar to Gaygısız (2010), Solmazer et al. (2016) investigated the relationship between cultural components (i.e. Hofstede’s cultural dimensions and Schwartz’s value dimensions), proximal factors (i.e. traffic law enforcements), and outcomes (i.e. traffic fatality rates). Among Hofstede’s cultural dimensions, power distance had significant positive relationships with majority of the traffic law enforcements and positive relationship with traffic fatality rates. Individualism and long-term orientation had positive relationships with majority of the traffic law enforcements and negative relationships with traffic fatality rates. Among Schwartz’s value dimensions, harmony, affective autonomy, intellectual autonomy, and egalitarianism were positively related to majority of the law enforcements whereas negatively related to traffic fatality rates. Embeddedness and hierarchy had negative relationships with majority of the traffic law enforcements and positive relationships with traffic fatality rates.

Recently Üzümcüoğlu et al. (under review) examined the relationship between cultural components (i.e. Hofstede's cultural dimensions and Schwartz's value dimensions) and proximal factors (i.e. traffic law enforcements and driver behaviors). In their study, speeding violations and non-speeding violations were taken as driver behaviors. Among Hofstede's cultural dimensions, power distance was negatively related to majority of the traffic law enforcements, and positively related to non-speeding violations. Individualism had positive correlations with majority of the traffic law enforcements, and negative correlations with non-speeding violations. Among Schwartz's value dimensions, harmony had significant positive correlations with majority of the law enforcements. Embeddedness had significant negative correlations with majority of the traffic law enforcements and positive correlations with non-speeding violations. Hierarchy had significant positive correlation only with non-speeding violations. Affective and intellectual autonomy had significant positive correlations with majority of the law enforcements, and negative correlations with non-speeding violations. Lastly, egalitarianism had negative correlation with non-speeding violations.

Based on the findings in the literature (Gaygısız, 2010; Özkan & Lajunen, 2007; Solmazer et al., 2016; Üzümcüoğlu et al., under review), there are significant relationships between cultural components, proximal factors and outcomes of G-TraSaCu-S. Among Hofstede's cultural dimensions, power distance and individualism consistently show significant relationships with both rule of law, law enforcements, driver behaviors (i.e. proximal factors) and fatality rates (i.e. outcomes). Power distance show significant positive relationships with fatality rates (i.e. outcomes) and non-speed violations (i.e. proximal factors) and significant negative relationships with rule of law and traffic law enforcements (i.e. proximal factors). Individualism shows significant negative relationships with fatality rates (i.e. outcomes) and non-speed violations (i.e. proximal factors), and significant positive relationships with rule of law and traffic law enforcements (i.e. proximal factors).

Among Schwartz's value dimensions (Gaygısız, 2010; Özkan & Lajunen, 2007; Solmazer et al., 2016; Üzümcüoğlu et al., under review), hierarchy, embeddedness, affective autonomy, intellectual autonomy and egalitarianism consistently show significant relationships with both rule of law, traffic law enforcements, and non-speed violations (i.e. proximal factors) and fatality rates (i.e. outcomes). Hierarchy and embeddedness show significant positive relationships with traffic fatality rates (i.e. outcomes) and non-speed violations (i.e. proximal factors). Additionally, hierarchy and embeddedness show significant negative relationships with traffic law enforcements and rule of law (i.e. proximal factors). Affective autonomy, intellectual autonomy, and egalitarianism show negative relationships with fatality rates (i.e. outcomes) and non-speed violations (i.e. proximal factors). Additionally, affective autonomy, intellectual autonomy, and egalitarianism show significant positive relationships with law enforcements and rule of law (i.e. proximal factors).

Taken together, inequality among people in a culture, not being comfortable with uncertainty and ambiguity, giving more importance social connections, having different roles based on positions, giving more importance to manipulating the naturan and social environment might have negative influences on traffic related outcomes (e.g. traffic fatality rates), whereas defining self-image as I, having future time orientation, not manipulating the natural and social environment but trying to adjust the self, sharing ideas independently, supporting people to have experiences that make them feel good, and being perceived as equal and caring about others' welfare might have positive influences on traffic related outcomes (e.g. traffic fatality rates).

2.1.4. Traffic Climate and Driver Behavior

In addition to culture of a society, traffic context of a given country might influence driver behaviors, which was suggested in macro level of G – TraSaCu – S. In a previous study conducted by Chu et al. (under review), the relationships between traffic climate and driver behaviors in China were examined. The findings suggested that external affective demands have positive correlations with violations. Internal

requirements and functionality have negative relationships with errors. Additionally, functionality also has negative relationships with violations and lapses. The results also revealed significant negative relationship between external affective demands and positive driver behaviors, and positive relationship between internal requirements, functionality and positive driver behaviors. Gehlert et al. (2014) examined the relationship between traffic climate and violations in Germany, and suggested negative relationship between internal requirements and violations, whereas a positive relationship was suggested between functionality and violations.

In both countries, traffic climate and driver behaviors were associated with each other; however some of the relationships showed different patterns. Hence, it might be inferred that, there was not a consistent pattern between traffic climate and driver behaviors among different countries. It should be noted that, the two studies used different measurements for driver behaviors, which might lead the different patterns. In the present research, the difference between Turkey and China was conducted as an exploratory study. Additionally, the relationships between traffic climate and driver behaviors both for Turkey and China were also investigated.

2.1.5. Aim of the Present Study

The road traffic fatality rates and number of road traffic accidents show differences between countries (WHO, 2015). The studies investigating the frequency of aberrant driver behaviors suggest that they show differences among countries (Lajunen et al., 2004; Özkan et al., 2006; Warner et al., 2011). Özkan et al. (2006) suggested that driver behaviors mediate the relationship between country/culture and driver behaviors. The underlying reasons of these differences might be due to the differences in perceived traffic climate. In the literature, there are studies that investigated the relationship between traffic climate and driver behaviors (Gehlert et al., 2014; Chu et al., under review); however this study is the first one to investigate the differences between two countries.

2.2. Method

2.2.1. Participants

There were 296 participants from Turkey and 925 participants from China who completed the survey. In order to have similar samples, 296 cases were chosen randomly from Chinese dataset after matching by age and sex with Turkish dataset.

2.2.1.1. Turkish sample

First, the data were checked for outliers in terms of total mileage. Two participants from the Turkish sample were dropped and 294 participants left. There were 139 female (47.3%) and 155 male (52.7%) drivers. The age range was between 19 and 61. For the whole sample, the mean age was 31.72 (*SD* = 8.51). For the female participants, the mean age was 31.04 (*SD* = 7.52) and for the male participants, the mean age was 32.34 (*SD* = 9.30). The average of driving experience in years was 11.37 (*SD* = 7.82). The mean of female participants' driving experience was 10.25 (*SD* = 7.03). The mean of male participants' driving experience was 12.37 (*SD* = 8.37). The mean of total mileage was 115792.12 (*SD* = 176534.34). The mean of total mileage of the female participants was 57238.25 (*SD* = 100442.40), and the mean of total mileage of the male participants was 168262.47 (*SD* = 210665.16). Sample characteristics of the Turkish sample were presented in Table 1.

2.2.1.2. Chinese sample

First, the data were checked for outliers in terms of total mileage. Four participants from the Chinese sample were dropped and 292 participants left. There were 137 female (46.9%) and 155 male (53.1%) drivers. The age range was between 21 and 64. For the whole sample, the mean age was 34.72 (*SD* = 7.56). For the female participants, the mean age was 33.21 (*SD* = 5.89) and for the male participants, the mean age was 36.05 (*SD* = 8.57). The average of driving experience in years was 6.54 (*SD* = 4.60). The mean of female participants' driving experience was 5.67 (*SD* = 3.88). The mean of male participants' driving experience was 7.31 (*SD* = 5.04). The mean of total mileage was 62856.21 (*SD* = 69692.96). The mean of total

mileage of the female participants was 48278.48 (*SD* = 50306.27), and the mean of total mileage of the male participants was 75803.53 (*SD* = 81209.70). Sample characteristics of the Chinese sample were presented in Table 1.

Table 1. Sample characteristics of the participants

Variables	Total Sample		Female Sample		Male sample	
	Turkey	China	Turkey	China	Turkey	China
N	294	292	139	137	155	155
Age						
Mean	31.72	34.72	31.04	33.21	32.34	36.05
SD	8.51	7.56	7.52	5.89	9.30	8.57
Driving experience						
Mean	11.37	6.54	10.25	5.67	12.37	7.31
SD	7.82	4.60	7.03	3.88	8.37	5.04
Total mileage						
Mean	115792.12	62856.21	57238.25	48278.48	168262.47	75803.53
SD	176534.34	69692.96	100442.40	50306.27	210665.16	81209.70

2.2.2. Measures

2.2.2.1. Traffic Climate Scale

The Traffic Climate Scale (TCS) was developed by Özkan and Lajunen (unpublished), consisting of 44 statements or adjectives that are related with possible situations in traffic. Participants were asked to express the degree that the items describe traffic in their country on a six-point scale (1 =does not describe it at all; 6 = very much describes it). The TCS has three factors: external affective demands, functionality, and internal requirements. Higher scores indicate higher perceptions of the given statements or adjectives. The Cronbach's Alpha levels of the subscales were presented in the result section of the current study.

2.2.2.2. Driver Behavior Questionnaire

The Driver Behavior Questionnaire (DBQ) was developed by Reason et al. (1990) and it was adapted to Turkish by Sümer, Lajunen, and Özkan (2002). The scale is consisted of 28 items. The DBQ measures aberrant driver behaviors under four factors: ordinary violations, aggressive violations, errors, and lapses. Addition to aberrant driver behaviors, Özkan and Lajunen (2005) developed DBQ positive

behaviors scale, consisting of 14 items, which aims to measure positive driver behaviors. In both scales, participants responded to items on a six-point scale (0 = never; 5 = always). Higher scores in a given factor represent higher frequency of the related behavior. The Cronbach's Alpha levels of the factors were presented in the result section of the current study.

2.2.3. Procedure

First, the ethical approval from Middle East Technical University Ethical Committee was obtained. Then, the English versions of the questionnaires were sent to the researchers in China for the translation procedure. Two researchers translated the questionnaires in Chinese by using forward back translation method. The questionnaires were entered into Qualtrics and then the study announcement was distributed through social media channels in both countries. Participants were reached by using snowball and convenience sampling. Participants filled out the questionnaire package including demographic information form, the TCS and the DBQ.

2.3. Results

2.3.1. Principal Component Analyses

2.3.1.1. Traffic Climate Scale

2.3.1.1.1. Turkish sample

The principal component analysis (PCA) with Promax rotation technique was carried out. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .907 and the Barlett's test of sphericity, that shows the correlation matrix produced by the items is factorable, was significant ($df = 946$, $p < .001$). The number of factors was entered as three. The decision was given by considering the scree plot and the factor structure of TCS in the previous studies (Özkan & Lajunen unpublished; Chu et al., under review; Gehlert et al., 2014). The cut-off value for loadings was determined as .40 (Reise et al., 2000).

The first factor was composed of 22 items. The majority of the items were about internal requirements, required skills and abilities in traffic environments. Hence the factor was named as “internal requirements”. The communalities ranged between .234 and .693. The item with the highest communality value was “Risky”. The initial eigenvalue of the first factor was 12.75 and explained 28.96% of the variance.

The second factor was composed of 13 items, which were about the functionality of the traffic environment. Hence the factor was named as “functionality”. The communalities ranged between .201 and .692. The item with the highest communality value was “Planned”. The initial eigenvalue of the second factor was 4.89 and explained 11.11% of the variance.

The third factor was composed of five items, which were about the emotional engagement in traffic environments. Hence the factor was named as “external affective demands”. The communalities ranged between .264 and .613. The item with the highest communality value was “Fast” The initial eigenvalue of the third factor was 2.01 and explained 4.57% of the variance.

Among 44 items, four items were eliminated. The item loadings of item 11, 16, 34, and 42 were below .40. The PCA with promax rotation yielded a three-factor solution for the TCS with remaining 40 items. The three factors explained the 44.67% of the total variance (see Table 3).

Table 3. Factor loadings and communality values of the items of TCS - Turkish sample

	Items	Components			Communality
		1 (IR)	2 (Func)	3 (EAD)	
1	Dangerous	**.596**			.500
2	Dynamic			**.700**	.480
3	Complicated	**.587**			.479
4	Aggressive	**.597**			.507
5	Exciting			**.624**	.462
6	Fast			**.746**	.613
7	Stressful	**.681**			.517
8	Monotonous			**-.490**	.264
9	Depend on luck	**.559**			.304
10	Requiring you on the alert	**.764**			.529
11	Depends on fate				.082*
12	Requiring cautiousness	**.807**			.584
13	Requiring experience	**.760**			.488
14	Requiring quickness	**.662**			.424
15	Requiring you obey rules		**.592**		.302
16	What you done becomes a benefit to you				.207*
17	Giving a feeling that you are worthless	**.501**			.301
18	Mobile			**.615**	.549
19	Causing tension	**.820**			.620
20	Including preventive measures		**.625**		.395
21	Under enforcement		**.750**		.544
22	Travel easily from place to place		**.530**		.449
23	Depend on mutual consideration		**.646**		.508
24	Planned		**.773**		.692
25	Putting pressure on you	**.553**			.304
26	Directed to compensate the things that happened		**.672**		.466
27	Including deterring rules			**.565**	.300
28	Risky	**.822**			.693
29	Chaotic	**.690**			.548
30	Requiring patience	**.741**			.539
31	Making irritated	**.710**			.557
32	Requiring vigilance	**.732**			.522
33	Requiring skillfulness	**.678**			.481
34	Harmonious				.361*
35	Time consuming	**.406**			.234
36	Annoying	**.721**			.564
37	Egalitarian			**.717**	.554
38	Safe			**.666**	.473
39	Functional			**.762**	.595
40	Free flowing			**.587**	.347
41	Requiring knowledge of traffic rules			**.490**	.201
42	Directing your behaviors				.146*
43	Unpredictable	**.669**			.506
44	Dense	**.661**			.459

Note: The cut-off value for factor loadings was determined as .40; *Items deleted.

2.3.1.1.2. Chinese sample

PCA with Promax rotation technique was carried out. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .923 and the Barlett's test of sphericity, that shows the correlation matrix produced by the items is factorable, was significant (df = 946, p < .001). The number of factors was entered as three. The decision was given by considering the scree plot and the factor structure of TCS in the previous studies. The cut-off value for loadings was determined as .40 (Reise et al., 2000).

The first factor was composed of 19 items. The majority of the items of the first factor were about emotional engagement in traffic environments. Hence the factor was named as "external affective demands". The communalities ranged between .301 and .645. The item with the highest communality value was "Chaotic". The initial eigenvalue of the first factor was 12.00 and explained 27.27% of the variance.

The second factor was composed of 12 items, which were about the functionality of the traffic environment. Hence the factor was named as "functionality". The communalities ranged between .556 and .758. The item with the highest communality value was "Functional". The initial eigenvalue of the second factor was 8.63 and explained 19.62% of the variance.

The third factor was composed of 10 items, which were about the knowledge that should be known by road users and internal requirements of road users. Hence the factor was named as "internal requirements". The communalities ranged between .527 and .668. The item with the highest communality value was "Requiring skillfulness". The initial eigenvalue of the third factor was 3.59 and explained 8.16% of the variance.

Among 44 items, three items were eliminated. The item loadings of item 2, 16, and 42 were below .40. The PCA with promax rotation yielded a three-factor solution for the TCS with remaining 41 items. The three factors explained the 55.105% of the total variance (see Table 4).

Table 4. Factor loadings and communality values of the items of TCS – Chinese sample

	Items	Components			Communality
		1 (EAD)	2 (Func)	3 (IR)	
1	Dangerous	**.647**			.419
2	Dynamic				.175*
3	Complicated	**.416**			.428
4	Aggressive	**.831**			.615
5	Exciting	**.855**			.564
6	Fast	**.516**			.322
7	Stressful	**.560**			.550
8	Monotonous	**.594**			.301
9	Depend on luck	**.476**			.348
10	Requiring you on the alert			**.705**	.660
11	Depends on fate	**.745**			.442
12	Requiring cautiousness			**.854**	.733
13	Requiring experience			**.861**	.690
14	Requiring quickness			**.854**	.674
15	Requiring you obey rules			**.831**	.566
16	What you done becomes a benefit to you				.276*
17	Giving a feeling that you are worthless	**.615**			.564
18	Mobile	**.636**			.479
19	Causing tension	**.670**			.630
20	Including preventive measures		**.865**		.723
21	Under enforcement		**.796**		.686
22	Travel easily from place to place		**.774**		.598
23	Depend on mutual consideration		**.764**		.556
24	Planned		**.839**		.702
25	Putting pressure on you	**.651**			.514
26	Directed to compensate the things that happened		**.749**		.601
27	Including deterring rules		**.705**		.575
28	Risky	**.559**			.517
29	Chaotic	**.746**			.645
30	Requiring patience			**.713**	.604
31	Making irritated	**.724**			.637
32	Requiring vigilance			**.739**	.622
33	Requiring skillfulness			**.852**	.668
34	Harmonious		**.757**		.596
35	Time consuming	**.452**			.424
36	Annoying	**.786**			.612
37	Egalitarian		**.767**		.587
38	Safe		**.819**		.681
39	Functional		**.858**		.758
40	Free flowing		**.834**		.670
41	Requiring knowledge of traffic rules			**.711**	.527
42	Directing your behaviors				.318*
43	Unpredictable	**.448**			.387
44	Dense			**.626**	.581

Note: The cut-off value for factor loadings was determined as .40; *Items deleted

2.3.1.2. The DBQ – Aberrant Behaviors

2.3.1.2.1. Turkish sample

PCA with Promax rotation technique was carried out. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .832 and the Barlett's test of sphericity, that shows the correlation matrix produced by the items is factorable, was significant (df = 378, p < .001). The number of factors was entered as two. The decision was given by considering the scree plot and the theoretical framework that the DBQ is based on (Reason et al., 1990). The cut-off value for factor loadings was determined as .40.

The first factor was composed of 16 items. The majority of the items of the first factor were about errors and lapses. Hence the factor was named as "errors". The communalities ranged between .150 and .439. The item with the highest communality value was "Miss "Give Way" signs, and narrowly avoid colliding with traffic having right of way". The initial eigenvalue of the first factor was 6.00 and explained 21.43% of the variance.

The second factor was composed of nine items, which were about aggressive and ordinary violations. Hence the factor was named as "violations". The communalities ranged between .246 and .580. The item with the highest communality value was "Overtake a slow driver on the inside". The initial eigenvalue of the second factor was 2.78 and explained 9.92% of the variance.

The PCA with promax rotation yielded a clear two-factor solution for the DBQ in the Turkish sample. Only three items (i.e. item 3, item 4, item 8) were eliminated since their item loadings were lower then the cut-off value, which was determined as .40. The two factors explained the 31.35% of the total variance (see Table 5).

Table 5. Factor loadings and communality values of the items of the DBQ — Aberrant Behaviors – Turkish sample

	Items	Component		Communality
		1 (Err)	2 (Vio)	
1	Hit something when reversing that you had not previously seen	**.615**		.329
2	Intending to drive to destination A, you "wake up" to find yourself on the road to destination B, perhaps because the latter is your more usual destination	**.404**		.150
3	Drive when you suspect you might be over the legal blood alcohol limit			.165*
4	Get into the wrong lane approaching a roundabout or a junction			.233*
5	Queuing to turn left onto a main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front	**.485**		.274
6	Fail to notice that pedestrians are crossing when turning into a side street from a main road	**.467**		.281
7	Sound your horn to indicate your annoyance to another road user		**.588**	.300
8	Fail to your rear-view mirror before pulling out, changing lanes etc.			.039*
9	Brake too quickly on a slippery road, or steer the wrong way in a skid	**.481**		.221
10	Pull out of a junction so far that the driver with right of way has to stop and let you out	**.527**		.391
11	Disregard the speed limit on a residential road		**.715**	.523
12	Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers	**.476**		.202
13	On turning left, nearly hit a cyclist who has come up on your inside	**.610**		.404
14	Miss "Give Way" signs, and narrowly avoid colliding with traffic having right of way	**.655**		.439
15	Attempt to drive away from the traffic lights in third gear (for manual cars) Attempt to drive away from the traffic lights by pressing gas pedal with unintentional strong pressure (for automatic transmission car)	**.556**		.286
16	Attempt to overtake someone that you hadn't noticed to be signaling a right turn	**.545**		.313
17	Become angered by another driver and give chase with the intention of giving him/her a piece of your mind		**.667**	.409
18	Stay in a motorway lane that you know will be closed ahead until the last minute before forcing your way into the other lane		**.469**	.246
19	Forget where you left your car in a car park	**.412**		.155
20	Overtake a slow driver on the inside		**.776**	.580
21	Race away from traffic lights with the intention of beating the driver next to you		**.682**	.482
22	Misread the signs and exit from a roundabout on the wrong road	**.511**		.303

Table 5. (continued)

	Items	Component		Communality
		1 (Err)	2 (Vio)	
23	Drive so close to the car in front that it would be difficult to stop in an emergency		**.494**	.402
24	Cross a junction knowing that the traffic lights have already turned against you	**.465**		.282
25	Become angered by a certain type of driver and indicate your hostility by whatever means you can		**.675**	.418
26	Realize that you have no clear recollection of the road along which you have just been travelling	**.475**		.213
27	Underestimate the speed on an oncoming vehicle when overtaking	**.642**		.367
28	Disregard the speed limit on a motorway		**.634**	.369

Note: The cut-off value for factor loadings was determined as .40; *Items deleted.

2.3.1.2.2. Chinese sample

The PCA with Promax rotation technique was carried out. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .947 and the Barlett's test of sphericity, that shows the correlation matrix produced by the items is factorable, was significant (df = 378, p < .001). The number of factors was entered as two. The decision was given by considering the scree plot and the theoretical framework that the DBQ is based on. The cut-off value for factor loadings was determined as .40 (Reise et al., 2000).

The first factor was composed of 16 items. The majority of the items were about ordinary and aggressive violations. Hence the factor was named as "violations". The communalities ranged between .361 and .617. The item with the highest communality value was "Stay in a motorway lane that you know will be closed ahead until the last minute before forcing your way into the other lane". The initial eigenvalue of the first factor was 11.34 and explained 41.20% of the variance.

The second factor was composed of 11 items, which were about lapses and errors. Hence the factor was named as "errors". The communalities ranged between .318 and .599. The item with the highest communality value was "Realize that you have

no clear recollection of the road along which you have just been travelling". The initial eigenvalue of the second factor was 1.67 and explained 6.02% of the variance.

Table 6. Factor loadings and communality values of the items of the DBQ – Aberrant Behaviors – Chinese sample

	Items	Component		Communality
		1 (Vio)	2 (Err)	
1	Hit something when reversing that you had not previously seen		**.422**	.318
2	Intending to drive to destination A, you "wake up" to find yourself on the road to destination B, perhaps because the latter is your more usual destination		**.460**	.343
3	Drive when you suspect you might be over the legal blood alcohol limit	**.766**		.429
4	Get into the wrong lane approaching a roundabout or a junction		**.754**	.543
5	Queuing to turn left onto a main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front		**.469**	.529
6	Fail to notice that pedestrians are crossing when turning into a side street from a main road	**.442**		.463
7	Sound your horn to indicate your annoyance to another road user	**.537**		.382
8	Fail to your rear-view mirror before pulling out, changing lanes etc.	**.403**		.431
9	Brake too quickly on a slippery road, or steer the wrong way in a skid		**.444**	.498
10	Pull out of a junction so far that the driver with right of way has to stop and let you out	**.559**		.399
11	Disregard the speed limit on a residential road	**.564**		.432
12	Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers		**.651**	.422
13	On turning left, nearly hit a cyclist who has come up on your inside	**.453**		.571
14	Miss "Give Way" signs, and narrowly avoid colliding with traffic having right of way		**.446**	.571
15	Attempt to drive away from the traffic lights in third gear (for manual cars) Attempt to drive away from the traffic lights by pressing gas pedal with unintentional strong pressure (for automatic transmission car)	**.542**		.431
16	Attempt to overtake someone that you hadn't noticed to be signaling a right turn	**.505**		.534
17	Become angered by another driver and give chase with the intention of giving him/her a piece of your mind	**.959**		.617
18	Stay in a motorway lane that you know will be closed ahead until the last minute before forcing your way into the other lane	**.697**		.533
19	Forget where you left your car in a car park		**.866**	.473
20	Overtake a slow driver on the inside			.271*

Table 6. (continued)

Items		Component		Communality
		1 (Vio)	2 (Err)	
21	Race away from traffic lights with the intention of beating the driver next to you	**.447**		.456
22	Misread the signs and exit from a roundabout on the wrong road		**.699**	.551
23	Drive so close to the car in front that it would be difficult to stop in an emergency	**.422**		.504
24	Cross a junction knowing that the traffic lights have already turned against you	**.467**		.361
25	Become angered by a certain type of driver and indicate your hostility by whatever means you can	**.743**		.510
26	Realize that you have no clear recollection of the road along which you have just been travelling		**.940**	.599
27	Underestimate the speed on an oncoming vehicle when overtaking		**.586**	.488
28	Disregard the speed limit on a motorway	**.886**		.562

Note: The cut-off value for factor loadings was determined as .40; *Items deleted

The PCA with promax rotation yielded a clear two-factor solution for DBQ in the Chinese sample. Only one item (i.e. item 20) was eliminated since its item loading was lower than the cut-off value, which was determined as .40. The two factors explained the 47.22% of the total variance (see Table 6).

2.3.1.3. The DBQ – Positive Driver Behaviors

2.3.1.3.1. Turkish sample

The PCA with .40 cut-off value was conducted. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .867 and the Barlett's test of sphericity, that shows the correlation matrix produced by the items is factorable, was significant (df = 91, p < .001). The number of factors was entered as one. The decision was given by considering the scree plot and the previous studies. The communalities ranged between .232 and .479. The items with the highest communalities were "Adjust your speed to help someone trying to overtake " and "When parking your car, take into account other road users' needs for space". The questionnaire included 14 items; however item 33 and item 41 had item loadings lower than .40, which is the

determined cut-off value. Hence, these two items were eliminated and 12 items remained in the factor. The eigenvalue of the factor was 4.66 and it explained 33.30% of the total variance (see Table 7).

Table 7. Factor loadings and communality values of the items of the DBQ – Positive Behaviors – Turkish sample

	Items	Component 1	Communality
29	Do your best not to be an obstacle for other drivers.	**.579**	.335
30	Give your right of way to another driver.	**.482**	.232
31	Try to use less frequently your long lights not to disturb the oncoming drivers.	**.594**	.353
32	Do not sound your horn to avoid noise.	**.521**	.271
33	Use your indicator to help the driver behind you whose view is not good enough for overtaking.		.136*
34	Avoid using the left lane not to slow down traffic on motorway.	**.649**	.421
35	Avoid close following not to disturb the car driver in front.	**.645**	.416
36	Adjust your speed to help someone trying to overtake.	**.691**	.478
37	Give up overtaking not to block the way of a car approaching behind.	**.667**	.445
38	Thank another driver for helping or showing consideration by waving your hand, sounding horn, etc.	**.518**	.268
39	Let pedestrians cross the road even if it is your right of way.	**.594**	.353
40	When parking your car, take into account other road users' needs for space.	**.692**	.479
41	Do not sound your horn to avoid disturbing the driver in front waiting even after the traffic light has switched to green.		.058*
42	Pay attention to a puddle not to splash water on pedestrians or other road users.	**.648**	.419

Note: The cut-off value for factor loadings was determined as .40; *Items deleted

2.3.1.3.2. Chinese sample

The PCA with .40 cut-off value was conducted. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .945 and the Barlett's test of sphericity, that shows the correlation matrix produced by the items is factorable, was significant (df = 91, p < .001). The number of factors was entered as one. The decision was given by considering the scree plot and previous studies. The communalities ranged between .241 and .693. The item with the highest communality was "Avoid close following not to disturb the car driver in front". The questionnaire included 14 items and all items loaded on the first factor. The eigenvalue of the factor was 7.53 and it explained 53.79% of the total variance (see Table 8).

Table 8. Factor loadings and communality values of the items of the DBQ – Positive Behaviors – Chinese sample

	Items	Component 1	Communality
29	Do your best not to be an obstacle for other drivers.	**.491**	.241
30	Give your right of way to another driver.	**.791**	.626
31	Try to use less frequently your long lights not to disturb the oncoming drivers.	**.786**	.618
32	Do not sound your horn to avoid noise.	**.767**	.588
33	Use your indicator to help the driver behind you whose view is not good enough for overtaking.	**.595**	.354
34	Avoid using the left lane not to slow down traffic on motorway.	**.762**	.581
35	Avoid close following not to disturb the car driver in front.	**.833**	.693
36	Adjust your speed to help someone trying to overtake.	**.762**	.581
37	Give up overtaking not to block the way of a car approaching behind.	**.788**	.621
38	Thank another driver for helping or showing consideration by waving your hand, sounding horn, etc.	**.600**	.360
39	Let pedestrians cross the road even if it is your right of way.	**.750**	.562
40	When parking your car, take into account other road users' needs for space.	**.813**	.661
41	Do not sound your horn to avoid disturbing the driver in front waiting even after the traffic light has switched to green.	**.637**	.406
42	Pay attention to a puddle not to splash water on pedestrians or other road users.	**.798**	.637

Note: The cut-off value for factor loadings was determined as .40

2.3.2. Correlations between Study Variables

2.3.2.1. Turkish Sample

The correlations between the study variables, namely age, total mileage, external affective demands, functionality, internal requirements, violations, errors and positive driver behaviors, and the internal reliability coefficients (i.e. Cronbach's Alpha) of subscales for the Turkish sample were presented in Table 9.

Age was significantly positively related to total mileage (r = .46 p < .001), functionality (r = .18, p = .003), and negatively related to violations (r = -.13, p = .022). Total mileage was significantly positively related to external affective demands (r = .12, p = .045).

External affective demands were significantly positively related to violations (r = .35, p < .001), errors (r = .60, p < .001), and negatively related to positive driver

behaviors (r = -.12, p = .034). Functionality was significantly negatively related to internal requirements (r = -.42, p < .001), violations (r = -.13, p = .030), and positive driver behaviors (r = -.14, p = .020). Internal requirements were significantly positively related to positive driver behaviors (r = .28, p < .001).

Violations were significantly positively related to errors (r = .34, = < .000) and significantly negatively related to positive driver behaviors (r = -.14, p = .016). Errors were significantly negatively related to positive driver behaviors (r = -.25, p < .001).

Table 9. Correlations between the study variables – Turkish sample

	1	2	3	4	5	6	7	8
1. Age	1							
2. Total mileage	.46**	1						
3. External	-.04	.12*	1					
4. Functionality	.18**	.07	-.01	1				
5. Internal	-.06	-.04	.03	-.42**	1			
6. Violations	-.13*	.07	.35**	-.13*	-.04	1		
7. Errors	-.11	-.09	.60**	-.05	.05	.34**	1	
8. Positive	-.01	.07	-.12*	-.14*	.28**	-.14*	-.25**	1
Cronbach's Alpha			.48	.88	.94	.82	.80	.84

Note: **p< .01; *p< .05

2.3.2.2. Chinese sample

Correlations between the study variables, namely age, total mileage, external affective demands, functionality, internal requirements, violations, errors and positive driver behaviors, and the internal reliability coefficients (i.e. Cronbach's Alpha) of subscales for the Chinese sample were presented in Table 10.

Age was significantly positively related to total mileage (r = .29, p < .001), and significantly negatively related to functionality (r = -.18, p = .003). External affective demands were significantly negatively related to internal requirements (r = .52, p < .001), violations (r = .14, p = .020), and errors (r = .13, p = .025). Functionality was positively related to internal requirements (r = .12, p = .038). Internal requirements were significantly negatively related to violations (r = -.12,

$p < .038$) and significantly positively related to positive driver behaviors ($r = .30$, $p < .001$). Violations were significantly positively related to errors ($r = .78$, $p < .001$) and significantly negatively related to positive driver behaviors ($r = -.28$, $p < .001$). Errors were significantly and negatively related to positive driver behaviors ($r = -.12$, $p = .042$).

Table 10. Correlations between the study variables – Chinese sample

	1	2	3	4	5	6	7	8
1. Age	1							
2. Total mileage	.29**	1						
3. External	-.02	.06	1					
4. Functionality	-.18**	-.08	-.11	1				
5. Internal	-.04	.05	.52**	.12*	1			
6. Violations	.04	.05	.14*	-.07	-.12*	1		
7. Errors	.01	.00	.13*	-.11	.04	.78**	1	
8. Positive	-.05	-.03	-.01	.08	.30**	-.28**	-.12*	1
Cronbach's Alpha			.93	.95	.93	.92	.88	.93

Note: **p<.01; *p<.05

2.3.3. Cross-Cultural Comparisons on Traffic Climate

2.3.3.1. Item-based comparisons – the TCS

The original version of TCS includes 44 items. A series of ANCOVA was conducted to investigate the cross-cultural differences on 44 items after controlling for age, gender, and total mileage. There were significant differences on all of the 44 items between Turkish and Chinese samples. Chinese participants scored higher than Turkish participants on 28 items. Turkish participants scored higher than Chinese participants on 16 items (see Table 11).

Table 11. Comparison of Turkish and Chinese samples using ANCOVA on the items of TCS

	Items	df	Turkey Mean	China Mean	F	p	η^2_p
1	Dangerous	1,573	5.21	3.52	305.06	.000	.35
2	Dynamic	1,573	4.43	4.08	12.93	.000	.02
3	Complicated	1,572	5.06	4.30	64.92	.000	.10
4	Aggressive	1,573	5.23	3.10	460.86	.000	.45
5	Exciting	1,573	3.16	2.86	6.99	.008	.01
6	Fast	1,573	4.09	3.47	32.11	.000	.05
7	Stressful	1,573	5.32	3.93	194.16	.000	.25
8	Monotonous	1,573	2.57	3.12	22.76	.000	.04
9	Depend on luck	1,573	4.61	4.01	27.68	.000	.05
10	Requiring you on the alert	1,573	5.42	4.54	95.95	.000	.14
11	Depends on fate	1,573	3.73	2.63	67.40	.000	.11
12	Requiring cautiousness	1,573	5.53	4.80	73.54	.000	.11
13	Requiring experience	1,573	5.33	4.76	45.80	.000	.07
14	Requiring quickness	1,573	5.10	4.80	11.74	.001	.02
15	Requiring you obey rules	1,573	3.73	5.20	159.87	.000	.22
16	What you done becomes a benefit to you	1,573	4.63	4.21	12.49	.000	.02
17	Giving a feeling that you are worthless	1,573	4.36	3.89	13.09	.000	.02
18	Mobile	1,573	4.80	3.80	93.89	.000	.14
19	Causing tension	1,573	5.44	3.87	263.34	.000	.32
20	Including preventive measures	1,573	2.60	3.69	92.28	.000	.14
21	Under enforcement	1,573	2.28	3.82	197.07	.000	.26
22	Travel easily from place to place	1,573	2.71	3.73	85.15	.000	.13
23	Depend on mutual consideration	1,573	2.05	3.44	162.56	.000	.22
24	Planned	1,573	2.05	3.61	205.61	.000	.26
25	Putting pressure on you	1,573	4.60	3.64	73.28	.000	.11
26	Directed to compensate the things that happened	1,573	2.39	3.78	180.64	.000	.24
27	Including deterring rules	1,573	2.49	3.98	175.23	.000	.23
28	Risky	1,573	5.28	3.80	282.25	.000	.33
29	Chaotic	1,573	5.09	3.33	244.70	.000	.30
30	Requiring patience	1,573	5.40	4.64	84.74	.000	.13
31	Making irritated	1,573	5.03	3.52	202.29	.000	.26
32	Requiring vigilance	1,573	5.35	4.67	70.90	.000	.11
33	Requiring skillfulness	1,573	5.18	4.89	11.71	.001	.02
34	Harmonious	1,573	2.63	3.69	82.30	.000	.13
35	Time consuming	1,573	4.96	4.14	59.63	.000	.09
36	Annoying	1,573	5.07	3.47	226.45	.000	.28
37	Egalitarian	1,573	2.01	3.56	235.99	.000	.29
38	Safe	1,573	2.21	3.62	169.67	.000	.23
39	Functional	1,573	2.49	3.80	141.22	.000	.20
40	Free flowing	1,573	2.62	3.25	30.38	.000	.05
41	Requiring knowledge of traffic rules	1,573	3.78	4.85	85.26	.000	.13
42	Directing your behaviors	1,573	3.70	4.30	31.03	.000	.05
43	Unpredictable	1,573	5.08	3.84	138.42	.000	.20
44	Dense	1,573	5.16	4.82	14.03	.000	.02

Note: Adjusted means are used.

2.3.3.2. Factor-based comparisons – the TCS

The TCS consisted of three factors (i.e. external affective demands, functionality, and internal requirements). A series of ANCOVA was conducted to investigate the cross-cultural differences on the three factors after controlling for age, gender, and total mileage. The difference between countries on the three factors was statistically significant. Chinese participants had higher scores than Turkish participants on external affective demands ($F(1, 573) = 832.68$, $p < .001$, $\eta^2_p = .59$) and functionality factors ($F(1, 573) = .181.64$, $p < .001$, $\eta^2_p = .24$). Turkish participants had higher scores than Chinese participants on internal requirements factor ($F(1, 573) = .25.74$, $p < .001$, $\eta^2_p = .04$) (see Table 12).

Table 12. Comparison of Turkish and Chinese samples using ANCOVA on the factors of TCS

Factors	df	Turkey	China	F	p	η^2_p
		Mean	Mean			
External	1,573	1.75	3.61	832.68	.000	.59
Functionality	1,573	2.60	3.66	181.64	.000	.24
Internal	1,573	5.12	4.79	25.74	.000	.04

Note: Adjusted means were presented

2.3.3.3. Gender-based comparisons within cultures – the TCS

2.3.3.3.1. Turkish sample

The TCS consisted of three factors (i.e. external affective demands, functionality, and internal requirements,). A series of ANCOVA for the Turkish sample was conducted to investigate gender differences on the three factors after controlling for age and total mileage. The difference between genders was not statistically significant for external affective demands ($F(1, 288) = .03$, $p = .874$, $\eta^2_p = .00$) , functionality ($F(1, 288) = 1.03$, $p = .312$, $\eta^2_p = .00$) , and internal requirements ($F(1, 288) = 1.67$, $p = .198$, $\eta^2_p = .01$) (see Table 13).

Table 13. Differences between genders on the TCS for the Turkish sample

Factors	df	Mean		F	p	η^2_p
		Female	Male			
External	1,288	1.77	1.78	.03	.874	.00
Functionality	1,288	2.63	2.53	1.03	.312	.00
Internal	1,288	5.20	5.09	1.67	.198	.01

Note: Adjusted means were presented

2.3.3.3.1. Chinese sample

The TCS consisted of the three factors (i.e. external affective demands, functionality, and internal requirements). A series of ANCOVA for the Chinese sample was conducted to investigate gender differences on the three factors after controlling for age and total mileage. The difference between genders was statistically significant for internal requirements factor. ($F(1, 282) = 4.29$, $p = .039$, $\eta^2_p = .02$) Female participants reported higher scores than male participants on internal requirements factor. The difference between genders were not statistically significant for external affective demands ($F(1, 282) = .00$, $p = .949$, $\eta^2_p = .00$) and functionality ($F(1, 282) = .13$, $p = .715$, $\eta^2_p = .00$) (see Table 14).

Table 14. Differences between genders on the TCS for the Chinese sample

Factors	df	Mean		F	p	η^2_p
		Female	Male			
External	1,282	3.59	3.58	.00	.949	.00
Functionality	1,282	3.63	3.68	.13	.715	.00
Internal	1,282	4.89	4.66	4.29	.039	.02

Note: Adjusted means were presented

2.3.4. Cross-Cultural Comparisons on Driver Behaviors

2.3.4.1. Item-based comparisons – the DBQ - Aberrant Behaviors

The original version of the DBQ – Aberrant Behaviors includes 28 items. A series of ANCOVA was conducted to investigate the cross-cultural differences on 28 items after controlling for age, gender, and total mileage. There were significant differences on 24 items between Turkish and Chinese samples. Chinese participants

responded higher frequency than Turkish participants on 18 items. Turkish participants responded higher frequency than Chinese participants on six items. There were not significant differences on four items (see Table 15).

Table 15. Comparison of Turkish and Chinese samples using ANCOVA on the items of the DBQ – Aberrant Behaviors

	Items	df	Turkey	China	F	p	η^2_p
			Mean	Mean			
1	Hit something when reversing that you had not previously seen	1,573	1.73	2.12	29.28	.000	.05
2	Intending to drive to destination A, you "wake up" to find yourself on the road to destination B, perhaps because the latter is your more usual destination	1,573	2.02	2.13	1.29	.256	.00
3	Drive when you suspect you might be over the legal blood alcohol limit	1,572	1.59	1.31	13.26	.000	.02
4	Get into the wrong lane approaching a roundabout or a junction	1,572	1.74	2.40	60.54	.000	.10
5	Queuing to turn left onto a main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front	1,573	1.59	1.97	22.93	.000	.04
6	Fail to notice that pedestrians are crossing when turning into a side street from a main road	1,572	1.43	1.85	31.16	.000	.05
7	Sound your horn to indicate your annoyance to another road user	1,572	3.10	2.57	22.90	.000	.04
8	Fail to your rear-view mirror before pulling out, changing lanes etc.	1,571	1.91	2.06	1.40	.237	.00
9	Brake too quickly on a slippery road, or steer the wrong way in a skid	1,573	1.68	1.91	9.13	.003	.02
10	Pull out of a junction so far that the driver with right of way has to stop and let you out	1,573	1.46	1.94	44.72	.000	.07
11	Disregard the speed limit on a residential road	1,573	2.76	1.90	69.35	.000	.11
12	Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers	1,572	1.34	2.17	116.60	.000	.17
13	On turning left, nearly hit a cyclist who has come up on your inside	1,572	1.38	1.83	44.56	.000	.07
14	Miss "Give Way" signs, and narrowly avoid colliding with traffic having right of way	1,573	1.35	1.91	63.40	.000	.10
15	Attempt to drive away from the traffic lights in third gear (for manual cars) Attempt to drive away from the traffic lights by pressing gas pedal with unintentional strong pressure (for automatic transmission car)	1,573	1.38	1.88	37.72	.000	.06
16	Attempt to overtake someone that you hadn't noticed to be signalling a right turn	1,573	1.28	1.88	82.45	.000	.13
17	Become angered by another driver and give chase with the intention of giving him/her a piece of your mind	1,573	1.49	1.63	3.05	.081	.01

Table 15. (continued)

	Items	df	Turkey	China	F	p	η^2_p
			Mean	Mean			
18	Stay in a motorway lane that you know will be closed ahead until the last minute before forcing your way into the other lane	1,573	1.82	1.68	2.76	.097	.01
19	Forget where you left your car in a car park	1,573	2.24	2.67	15.57	.000	.03
20	Overtake a slow driver on the inside	1,573	3.06	2.49	26.44	.000	.04
21	Race away from traffic lights with the intention of beating the driver next to you	1,573	1.78	2.14	14.48	.000	.03
22	Misread the signs and exit from a roundabout on the wrong road	1,573	1.28	2.21	184.09	.000	.24
23	Drive so close to the car in front that it would be difficult to stop in an emergency	1,573	1.58	1.93	20.83	.000	.04
24	Cross a junction knowing that the traffic lights have already turned against you	1,573	1.72	2.05	14.81	.000	.03
25	Become angered by a certain type of driver and indicate your hostility by whatever means you can	1,573	2.37	2.00	13.57	.000	.02
26	Realize that you have no clear recollection of the road along which you have just been travelling	1,572	1.80	2.55	59.88	.000	.10
27	Underestimate the speed on an oncoming vehicle when overtaking	1,573	1.56	2.17	71.55	.000	.11
28	Disregard the speed limit on a motorway	1,573	2.33	1.58	58.26	.000	.09

Note: Adjusted means are used.

The original version of the DBQ – Positive Driver Behaviors includes 14 items. A series of ANCOVA was conducted to investigate the cross-cultural differences on 14 items for age, gender, and total mileage. There were significant differences on seven items between Turkish and Chinese samples. Chinese participants responded higher frequency than Turkish participants on five items. Turkish participants responded higher frequency than Chinese participants on two items. There were not significant differences between two countries on seven items (see Table 16).

Table 16. Comparison of Turkish and Chinese samples using ANCOVA on the items of the DBQ – Positive Behaviors

	Items	df	Turkey	China	F	p	η^2_p
			Mean	Mean			
29	Do your best not to be an obstacle for other drivers.	1,573	4.76	4.53	2.85	.092	.01
30	Give your right of way to another driver.	1,573	3.49	4.45	94.74	.000	.14
31	Try to use less frequently your long lights not to disturb the oncoming drivers.	1,573	4.97	5.03	.28	.598	.00
32	Do not sound your horn to avoid noise.	1,573	4.44	4.72	5.40	.020	.01
33	Use your indicator to help the driver behind you whose view is not good enough for overtaking.	1,573	2.99	3.78	31.76	.000	.05
34	Avoid using the left lane not to slow down traffic on motorway.	1,573	4.83	4.85	.04	.837	.00
35	Avoid close following not to disturb the car driver in front.	1,573	4.65	4.84	3.03	.082	.01
36	Adjust your speed to help someone trying to overtake.	1,572	4.71	4.55	2.45	.118	.00
37	Give up overtaking not to block the way of a car approaching behind.	1,573	4.63	4.73	.88	.349	.00
38	Thank another driver for helping or showing consideration by waving your hand, sounding horn, etc.	1,573	4.96	4.33	29.48	.000	.05
39	Let pedestrians cross the road even if it is your right of way.	1,573	4.50	4.83	10.74	.001	.02
40	When parking your car, take into account other road users' needs for space.	1,573	5.11	5.04	.61	.435	.00
41	Do not sound your horn to avoid disturbing the driver in front waiting even after the traffic light has switched to green.	1,573	3.74	4.24	14.70	.000	.03
42	Pay attention to a puddle not to splash water on pedestrians or other road users.	1,573	5.18	4.91	6.61	.010	.01

Note: Adjusted means were presented

2.3.4.2. Factor-based comparisons – the DBQ

The DBQ – Aberrant Behaviors consisted of two factors (i.e. violations and errors). The DBQ – Positive Driver Behaviors had only one factor. A series of ANCOVA was conducted to investigate the cross-cultural differences on three factors after controlling for age, gender, and total mileage. The difference between countries was significant for violations ($F(1, 573) = .32.96$, $p < .001$, $\eta^2_p = .05$) and errors ($F(1, 573) = 155.86$, $p < .001$, $\eta^2_p = .21$). Turkish participants reported higher frequency for violations than Chinese participants, whereas Chinese participants reported higher frequency for errors than Turkish participants. The difference between countries was

not significant for positive driver behaviors ($F(1, 573) = .05$, $p = .481$, $\eta^2_p = .00$) (see Table 17).

Table 17. Comparison of Turkish and Chinese samples using ANCOVA on the factors of DBQ

Factors	df	Turkey	China	F	p	η^2_p
		Mean	Mean			
Violations	1,573	2.25	1.90	32.96	.000	.05
Errors	1,573	1.57	2.20	155.86	.000	.21
Positive	1,573	4.69	4.63	.50	.481	.00

Note: Adjusted means were presented

2.3.4.3. Gender-based comparisons within cultures – the DBQ

2.3.4.3.1. Turkish sample

The DBQ – Aberrant Behaviors consisted of two factors (i.e. violations and errors). The DBQ – Positive Driver Behaviors had only one factor. A series of ANCOVA for the Turkish sample was conducted to investigate gender differences on the three factors after controlling for age and total mileage. The difference between genders was significant for violations ($F(1, 288) = 18.12$, $p < .001$, $\eta^2_p = .06$). Male participants reported higher frequency for violations than female participants. The difference between genders was not significant for errors ($F(1, 288) = .029$, $p = .590$, $\eta^2_p = .00$) and positive driver behaviors ($F(1, 299) = .17$, $p = .685$, $\eta^2_p = .00$) (see Table 18).

Table 18. Differences between genders on the DBQ for the Turkish sample

Factors	df	Mean		F	p	η^2_p
		Female	Male			
Violations	1,288	2.07	2.46	18.12	.000	.06
Errors	1,288	1.56	1.59	.29	.590	.00
Positive	1,288	4.72	4.68	.17	.685	.00

Note: Adjusted means were presented

2.3.4.3.2. Chinese sample

The DBQ – Aberrant Behaviors consisted of two factors (i.e. violations and errors). The DBQ – Positive Driver Behaviors had only one factor. A series of ANCOVA for the Chinese sample was conducted to investigate gender differences on the three factors after controlling for age and total mileage. The difference between genders was significant for errors ($F(1, 282) = 6.08$, $p = .014$, $\eta^2_p = .02$). Female participants reported higher frequency for errors than male participants. The difference between genders was not significant for violations ($F(1, 282) = 1.92$, $p = .167$, $\eta^2_p = .01$) and positive driver behaviors ($F(1, 282) = .64$, $p = .423$, $\eta^2_p = .00$) (see Table 19).

Table 19. Differences between genders on the DBQ for the Chinese sample

Factors	df	Mean		F	p	η^2_p
		Female	Male			
Violations	1,282	1.91	2.02	1.92	.167	.01
Errors	1,282	2.31	2.10	6.08	.014	.02
Positive	1,282	4.57	4.66	.64	.423	.00

Note: Adjusted means were presented

2.3.5. Regression Analysis

2.3.5.1. The relationships between traffic climate and driver behaviors

2.3.5.1.1. Turkish sample

In order to test the relationships between traffic climate and driver behaviors, three hierarchical regression analyses were conducted for the Turkish sample. In all analyses, age, gender, and total mileage were entered in the first step as the control variables. The factors of TCS were entered in the second step (see Table 20).

In the first hierarchical regression analysis, violations were entered as the dependent variable. In the first step, age, gender, and total mileage were entered as control variables and the model was significant ($R^2 = .10$, $F(3, 288) = 10.09$, $p < .001$). Age was significantly negatively ($\beta = -.18$, $p < .004$) and being male was significantly positively related to violations ($\beta = .25$, $p < .001$). The three factors of TCS were entered in the second step and the model was significant ($\Delta R^2 = .12$, $F(6, 285) =$

13.01, $p < .001$). External affective demands were significantly positively ($\beta = .33$, $p < .001$) and functionality was significantly negatively ($\beta = -.13$, $p = .030$) related to violations.

In the second hierarchical regression analysis, errors were entered as the dependent variable. In the first step, age, gender, and total mileage were entered as control variables, however the model was not significant ($R^2 = .01$, $F(3, 288) = 1.35$, $p = .258$). The three factors of TCS were entered in the second step and the model was significant ($\Delta R^2 = .38$ $F(6, 285) = 29.97$, $p < .001$). Among the three factors of TCS, only external affective demands were significantly positively related to errors ($\beta = .62$, $p < .001$).

In the third hierarchical regression analysis, positive driver behaviors were entered as the dependent variable. In the first step, age, gender, and total mileage were entered as control variables, however the model was not significant ($R^2 = .01$, $F(3, 288) = .82$, $p = .484$). The three factors of TCS were entered in the second step and the model was significant ($\Delta R^2 = .10$, $F(6, 285) = 5.80$, $p < .001$). Among the three factors of TCS, external affective demands were significantly negatively ($\beta = -.15$, $p = .009$) and internal requirements were significantly positively ($\beta = .28$, $p < .001$) related to positive driver behaviors.

Table 20. Hierarchical Regression Analysis on TCS and DBQ – Turkish sample

	1. Violations					2. Errors					3. Positive behaviors				
Variables	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p
	.10	.10	10.09		.000	.01	.01	1.35		.258	.01	.01	.82		.484
Age				-.18	.004				-.07	.266				-.06	.398
Gender				.25	.000				.03	.590				-.03	.685
Mileage				.07	.269				-.07	.328				.11	.120
	.22	.12	13.01		.000	.39	.37	29.97		.000	.11	.10	5.80		.000
Ext				.33	.000				.62	.000				-.15	.009
Func				-.13	.030				-.02	.750				-.02	.740
Internal				-.09	.138				.03	.625				.28	.000

Note: TCS; Ext: External affective demands; Func: Functionality; Internal: Internal requirements

2.3.5.1.2. Chinese sample

In order to test the relationship between traffic climate and driver behaviors, three hierarchical regression analyses were conducted for the Chinese sample. In all analyses, age, gender, and total mileage was entered in the first step as the control variables. The factors of TCS were entered in the second step (see Table 21).

In the first hierarchical regression analysis, violations were entered as the dependent variable. In the first step, age, gender, and total mileage were entered as control variables, however the model was not significant (R^2 = .02, F(3, 282) = 1.60, p = .189). The three factors of TCS were entered in the second step (ΔR^2 = .05, F(6, 279) = 3.55, p = .002) and the model was significant. Among the three factors of TCS, external affective demands were significantly positively (β = .25, p < .001) and internal requirements were significantly negatively (β = -.22, p = .002) related to violations.

In the second hierarchical regression analysis, errors were entered as the dependent variable. In the first step, age, gender, and total mileage were entered as control variables, however the model was not significant (R^2 = .02, F(3, 282) = 2.03, p = .110). The three factors of TCS were entered in the second step (ΔR^2 = .03, F(6, 279) = 2.32, p = .033) and the model was significant. Among the three factors of TCS, only external affective demands were significantly positively related to errors (β = .14, p = .045).

In the third hierarchical regression analysis, positive driver behaviors were entered as the dependent variable. In the first step, age, gender, and total mileage were entered as control variables, however the model was not significant (R^2 = .01, F(3, 282) = .50, p = .680). The three factors of TCS were entered in the second step and the model was significant (ΔR^2= .13, F(6, 279) = 7.62, p < .001). Among the three factors of TCS, external affective demands were significantly negatively (β = -.24, p < .001) and internal requirements were significantly positively (β = .43, p < .001) related to positive driver behaviors.

Table 21. Hierarchical Regression Analysis on the TCS and DBQ – Chinese sample

	1. Violations					2. Errors					3. Positive behaviors				
Variables	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p
	.02	.02	1.60		.189	.02	.02	2.03		.110	.01	.01	.50		.680
Age				.05	.469				.02	.773				-.05	.390
Gender				.08	.167				-.15	.014				.05	.423
Mileage				.05	.386				.03	.628				-.03	.672
	.07	.05	3.55		.002	.05	.03	2.32		.033	.14	.13	7.62		.000
Ext				.25	.000				.14	.045				-.24	.000
Func				-.00	.966				-.09	.156				-.01	.896
Internal				-.22	.002				-.04	.544				.43	.000

Note: * Ext: External affective demands; Func: Functionality; Internal: Internal requirements

2.4. Discussion

2.4.1. Overview

The issue of road traffic injuries and fatalities is a global public health problem. The road traffic fatality rates show variances among countries and regions (WHO, 2015). The literature findings reveal that driver behaviors also show regional differences (e.g. Lajunen et al., 2004; Özkan et al., 2006; Warner et al., 2011). It is assumed that traffic environment of a country that a driver mostly drives has close relationships with the driver's behaviors (Chu et al., under review; Gehlert et al., 2014). Hence, it might be plausible to suggest that the possible explanation for the differences in driver behaviors might be about the differences in perceived traffic climate of countries' traffic environment.

In the current study, the differences between Turkey and China in traffic climate and driver behaviors were tested. The gender differences in traffic climate and driver behaviors within countries were also further investigated. Lastly, the relationships between driver behaviors and traffic climate in Turkey and China were investigated separately.

In the present chapter, the findings were discussed based on the literature and cultural differences between Turkey and China. Moreover, the limitations of the study, implications and suggestions for further research were presented.

2.4.2. Summary and Discussion of the Results

2.4.2.1. Principal component analyses on the TCS and the DBQ

The items of TCS, DBQ – Aberrant Behaviors and DBQ – Positive Behaviors that used in the present study were factor analyzed. The TCS is consisted of 44 adjectives or statements. The DBQ – Aberrant Behaviors is consisted of 28 items and the DBQ – Positive Behaviors is consisted of 14 items. All PCA were conducted for Turkey and China separately.

The results of the PCA for TCS yielded a clear three-factor structure for both Turkey and China. The findings of the current study were supported by the previous studies (Chu et al., under review; Gehlert et al., 2014; Özkan & Lajunen, unpublished). In the previous studies, the factors were named as external affective demands/requirements, functionality, and internal requirements. In the present study, since the factor structures were similar, the same factor names suggested in the literature were used. It can be claimed that driver perceive traffic climate under three dimensions. External affective demands dimension is about emotional engagement that is required by road users. Functionality dimension includes characteristics of safety and mobility and requirements for a functional traffic system. Internal requirements dimension includes skills and abilities of road users that are required while participating in traffic (Gehlert et al., 2014). Since the factor structures showed similarity between the two cultures (i.e. Turkey and China), it could be claimed that the TCS is an effective measure to evaluate traffic climate among different cultures. Moreover, the cross-cultural findings show that three-factor structure of the TCS is reliable and valid in different cultures. Additionally, the claim that the three components of traffic climate were similar with organizational safety climate was also supported with the three-factor structure of TCS.

Based on the findings, for the TCS, it can be claimed that even there are slight differences on the items of factors between countries; the traffic climate can be evaluated under three dimensions. It should be noted that, the slight differences on the items of external affective demands and internal requirements pointed out a

pattern about the affects that might be experienced in traffic environment. The majority of these items loaded on the external affective demands in China sample, whereas they loaded on the internal requirements in Turkish sample. These different loading might suggest that, negative affects require coping when experienced in traffic environment. Hence, Turkish drivers might perceive these affects as "requiring coping skills", and perceive them under internal requirements dimension. The factor that was relatively stable was functionality. The items related to functionality might be more concrete compared to items of other two factors. Hence, they might be perceived as similarly in the two cultures.

The nature of aberrant driver behaviors and positive driver behaviors are different, hence the PCA were carried out separately for DBQ – Aberrant Behaviors and DBQ – Positive Behaviors. First, the PCA was conducted for the DBQ – Aberrant Behaviors. The results of PCA yielded a clear two-factor structure (i.e. violations and errors), which supports the general theoretical structure of the DBQ. Reason et al. (1990) conducted a PCA showing that errors and violations are statistically different from each other. This finding supports the assumption that errors and violations have different psychological mechanisms. The general two-factor structure of the questionnaire is about the intentional and unintentional aberrant driver behaviors. In the present study, in the same line with the literature, violations factor corresponds to intentional aberrant driver behaviors and errors factor corresponds to unintentional aberrant driver behaviors. The two-factor structure of the DBQ was also supported by previous studies among different cultures (e.g. Lajunen et al., 2004; Martinussen et al., 2013; Özkan et al., 2006). de Winter and Dodou (2010) conducted a meta-analysis study, with the studies used the DBQ. The results also supported the differentiation between violations and errors.

Second, the PCA was carried out for the DBQ – Positive Behaviors. The results revealed one factor structure for both Turkey and China. The results support the original one factor structure of the DBQ – Positive Behaviors (Özkan & Lajunen, 2005). Hence, the findings of the current study are in line with the previous findings,

supporting the cross-cultural two-factor structure of the DBQ – Aberrant Behaviors, and one-factor structure of the DBQ - Positive Behaviors.

In the further analyses of present study, the TCS was used with three factors; namely external affective demands, functionality, and internal requirements. The DBQ – Aberrant Driver Behaviors was used with two factors; namely violations and errors. The DBQ – Positive Behaviors was used as one factor. The findings support the idea that violations and errors are different in their nature.

Although Turkey and China have different cultures, the factor structures of all three measures were the same for both Turkey and China. In the next section, the correlations between the study variables were and within countries were presented.

2.4.2.2. Demographic variables and correlation analyses

The two samples showed differences based on their demographic variables, such as age, driving experience, and total mileage. The mean age of Turkish drivers were younger than Chinese drivers; however Turkish drivers had higher driving experience and total mileage than Chinese drivers. It might be inferred that, Turkish drivers drive more frequently than Chinese drivers. Especially, the difference in mean age and total mileage between the two samples was higher for male drivers. Since being male, younger age, and higher mileage were related to higher violations (de Winter & Dodou, 2010), the stated differences might have effects on the findings of the current study.

In the Turkish sample, age was positively related to functionality dimension whereas in the Chinese sample, age was negatively related to functionality. Total mileage was positively related to external affective demands in the Turkish sample; however no significant relationship was observed for the Chinese sample. Only one of the previous studies examined the association between age and traffic climate, which suggested a negative relationship between age and functionality among Chinese drivers (Chu et al., under review). In the current study, the findings are in line with the previous study for the Chinese sample, however the stated relationship is the

opposite for the Turkish sample. The contradictory findings highlight the need for further investigation of the relationship between demographic variables and traffic climate.

Considering the relationship between age and driver behaviors, only age was significantly negatively related to violations in the Turkish sample. Violations are described as the style that drivers choose to drive and their habits that established with experience (de Winter & Dodou, 2010). de Winter and Dodou (2010) conducted a meta-analysis about the DBQ and suggested that violations decrease with age. The findings of the current study were partially consistent with the findings of the meta-analysis (de Winter & Dodou, 2010) since the relationship between age and violations was not significant for China. The difference between Turkish and Chinese drivers in terms of violation can be explained by higher mileage and younger age in Turkish drivers.

2.4.2.3. Comparisons on traffic climate

2.4.2.3.1. Item-based comparisons – the TCS

A series of ANCOVA was conducted to investigate the differences between Turkey and China on the items of TCS. In all analyses, age, gender, and total mileage were taken as the control variables. The results showed that the two cultures have significant differences on all of the items. Although the differences were significant for all of the items, the effect sizes showed variances from small to large. Based on the partial Eta square results, 12 items had small effect sizes, 11 items had medium effect sizes, and 21 items had large effect sizes. Among the 12 items with small effect sizes, Turkish participants scored higher than Chinese participants on nine of the items (item 2, item 5, item 6, item 9, item 14, item 16, item 17, item 33, and item 44) namely; “dynamic”, “exciting”, “fast”, “depend on luck”, “requiring quickness”, “what you done becomes a benefit to you”, “giving a feeling that you are worthless”, “requiring skillfulness”, and “dense”. The three items that Chinese participants scored higher than Turkish participants were (item 8, item 40, and item 42) “monotonous”, “free flowing”, and “directing your behaviors”. Among the 11 items

with medium effect size, Turkish participants scored higher than Chinese participants on eight of the items (item 3, item 11, item 12, item 13, item 25, item 30, item 32, and item 35) namely; “complicated”, “depends on fate”, “requiring cautiousness”, “requiring experience”, “putting pressure on you”, “requiring patience”, “requiring vigilance”, and “time consuming”. The three items that Chinese participants scored higher than Turkish participants were (item 22, item 34, and item 41) “travel easily from place to place”, “harmonious”, and “requiring knowledge of traffic rules”. Among the 21 items with large effect size, Turkish participants scored higher than Chinese participants on 11 of the items (item 1, item 4, item 7, item 10, item 18, item 19, item 28, item 29, item 31, item 36, and item 43) namely; “dangerous”, “aggressive”, “stressful”, “requiring you on the alert”, “mobile”, “causing tension”, “risky”, “chaotic”, “making irritated”, “annoying”, and “unpredictable”. The 10 items that Chinese participants scored higher than Turkish participants were (item 15, item 20, item 21, item 23, item 24, item 26, item 27, item 37, item 38, item and 39) “requiring you obey rules”, “including preventive measures”, “under enforcement”, “depend on mutual consideration”, “planned”, “directed to compensate the things that happened”, “including deterring rules”, “egalitarian”, “safe”, and “functional”.

2.4.2.3.2. Factor-based comparisons – the TCS

A series of ANCOVA was conducted to investigate the differences between Turkish and Chinese participants on the three subscales of TCS (i.e. external affective demands, functionality, and internal requirements). In all analyses, age, gender, and total mileage were taken as the control variables. Internal requirements showed significant differences between Turkish and Chinese drivers with small effect size, and Turkish participants scored higher than Chinese participants. The external affective demands and functionality subscales also showed significant differences between Turkish and Chinese drivers with large effect size. On both subscales, Chinese participants showed higher scores than Turkish participants.

2.4.2.3.3. Gender-based comparisons – the TCS

A series of ANCOVA was conducted to investigate the gender differences on the three subscales of TCS. In all analyses, age and total mileage were taken as the control variables. The analyses were carried out separately for Turkish and Chinese samples. For the Turkish sample, the differences for gender on the subscales of TCS were not significant. In the Chinese sample, only the internal requirements subscale showed significant differences between genders with small effect size, and female drivers scored higher than male drivers.

When the item-based comparisons were taken into consideration with the factor analyses, the items with large effect sizes show two main patterns. The first pattern was about the eleven items that Turkish drivers scored higher than Chinese drivers. Among the 11 items that Turkish sample scored higher than Chinese sample, nine of them loaded on different factors in the two samples. These nine items were mainly about negative affects that they can face in traffic environment. These items loaded on internal requirements factor in the Turkish sample, whereas they loaded on external affective demands factor in the Chinese sample. In can be inferred that, Turkish drivers perceive these affects as affects that they have to cope with in traffic environment. In other words, Turkish drivers might perceive these affects as the ones requiring coping in traffic environment. Hence they might perceive these affects as "requiring coping skills". On the other hand, Chinese participants perceive these affects as emotional engagement in traffic environment. This difference can be explained by the differences in harmony and mastery dimensions (described by Schwartz, 2006) between Turkey and China. In societies that are high in harmony, people do not manipulate the natural and social environment but rather they try to adjust themselves. Turkey is considered as a harmonic culture compared to China. In Turkey, people might try to accept and fit into the social world rather than try to change it. Hence, Turkish drivers might have internalized some of the negative affects they face in the traffic environment; and they perceive these affects that they have to cope with. In high mastery societies, people give importance to manipulating the natural and social environment and China has a higher score than Turkey in the

stated dimension. Since drivers in China might try to manipulate the social environment, they might externalize the affects they experience in traffic environment. Hence, the underlying reason for the differences between factor loadings for the stated items can be summarized as the harmonic perspective of Turkish drivers and high score of China in mastery dimension.

The second pattern is about the 10 items that Chinese drivers scored higher than Turkish participants. When these items are examined, nine of them loaded on functionality factor in both cultures. In other words, Chinese drivers perceived the items that are about functionality higher than Turkish participants. The differences in the stated items can be explained by short-term versus long-term orientation cultural dimension of Hofstede (2001). Short-term and long-term orientation is about the people's focus on time orientation (i.e. present vs. future). When Turkey and China are compared on this dimension, China is a long-term orientated culture, whereas Turkey is a short-term oriented culture. In long-term oriented societies, saving and investments are important and people put effort to their future (Hofstede, 2001). As this information is considered in traffic context, making investments might increase the infrastructure and also functionality. Additionally, they might be better in safety related developments and strategies. Hence, since China is a long-term oriented culture, the higher scores on functionality related items in China was not surprising. The underlying reason for the differences in functionality related items might be summarized as the long-term orientation of Chinese drivers.

The two factors showing difference with large effect size were external affective demands and functionality. Previous findings in the literature show that (Chu et al., under review; Gehlert et al., 2014) both external affective demands and functionality factors have positive relationships with undesired traffic related outcomes, such as violations, errors, and accidents. The differences in traffic fatality rates (WHO, 2015) between Turkey and China might be related to the differences between external affective demands and functionality factors. Similarly with the inferences made for the pattern differences on item based comparisons, the differences in

traffic climate can also be explained by being high on harmonic dimension for Turkey, and being high on mastery and long-term orientation dimensions for China.

In the Turkish sample, the results suggested no gender difference in the perception of traffic climate, whereas in the Chinese sample, female participants perceived traffic climate as more cognitively demanding (i.e. high in internal requirements) than male drivers. Chinese female drivers might be more able to think that their traffic environment requires more skills than Chinese male drivers think. When the results are taken into consideration with gender differences in driver behaviors, a similar pattern can be observed. Chinese female drivers also showed higher errors than Chinese male drivers. Since errors are about performance limits of the drivers', which are about perceptual, attentional, and information processing abilities, the higher internal requirements score of female drivers in China might have influences on their higher errors. However, it should be noted that, both analyses had small effect sizes, meaning that there were slight differences.

2.4.2.4. Comparisons on driver behaviors

2.4.2.4.1. Item-based comparisons – DBQ – Aberrant Behaviors

A series of ANCOVA was conducted to investigate the differences between Turkey and China on the items of DBQ – Aberrant Behaviors. In all analyses, age, gender, and total mileage were taken as the control variables. The results showed that the two cultures have significant differences on 24 of 28 items. Although the differences were significant for the majority of the items, the effect sizes showed variances from small to large. Based on the partial Eta square results, 12 items had small effect sizes, 10 items had medium effect sizes, and two items had large effect sizes. Among the 12 items with small effect size, Turkish participants scored higher than Chinese participants on four of the items (item 3, item 7, item 20, and item 25) namely; "Drive when you suspect you might be over the legal blood alcohol limit", "Sound your horn to indicate your annoyance to another road user", "Overtake a slower driver on the inside", and "Become angered by a certain type of driver and indicate your hostility by whatever means you can". The eight items that Chinese

participants scored higher than Turkish participants were (item 1, item 5, item 6, item 9, item 19, item 21, item 23, and item 24) “Hit something when reversing that you had not previously seen”, “Queuing to turn left onto a main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front”, “Fail to notice that pedestrians are crossing when turning into a side street from a main road”, “Brake too quickly on a slippery road, or steer the wrong way in a skid”, “Forget where you left your car in a car park”, “Race away from traffic lights with the intention of beating the driver next to you”, “Drive so close to the car in front that it would be difficult to stop in an emergency”, and “Cross a junction knowing that the traffic lights have already turned against you”. Among the 10 items with medium effect size, Turkish participants scored higher than Chinese participants on two of the items (item 11 and item 28) namely; “Disregard the speed limit on a residential road” and “Disregard the speed limit on a motorway”. The items that Chinese participants scored higher than Turkish participants were (item 4, item 10, item 13, item 14, item 15, item 16, item 26, and item 27) “Get into the wrong lane approaching a roundabout or a junction”, “Pull out of a junction so far that the driver with right of way has to stop and let you out”, “On turning left, nearly hit a cyclist who has come up on your inside”, “”Miss “Give away” signs, and narrowly avoid colliding with traffic having right of way”, “Attempt to drive away from the traffic light in third gear (for manual cars)/Attempt to drive away from traffic lights by pressing gas pedal with unintentional strong pressure (for automatic transmission car)”, “Attempt to overtake someone that you hadn’t noticed to be signaling a right turn”, “Realize that you have no clear recollection of the road along which you have just been travelling”, and “Underestimate the speed on an oncoming vehicle”. In the two items, which had strong differences, Chinese participants scored higher than Turkish participants (item 12 and item 22). The items were “Switch on one thing, such as the headlights, when you meant to switch on something else” and “Misread the signs and exit from a roundabout on the wrong road”.

There were only two items with large effect size and in both items, Chinese drivers reported higher frequency than Turkish drivers: “Switch on one thing, such as the

headlights, when you meant to switch on something else" and "Misread the signs and exit from a roundabout on the wrong road". Both items are about errors factor of the DBQ. Chinese drivers scored higher than Turkish drivers on functionality items, which can be inferred that they perceive their traffic environment as functional. This difference may lead Chinese drivers pay less attention to their behaviors while driving. Gehlert et al. (2014) suggested that as people perceive their traffic environment functional, they feel safer in traffic and perceive traffic less risky. That relationship might have caused higher errors among Chinese drivers.

2.4.2.4.2. Item-based comparisons – DBQ – Positive Behaviors

A series of ANCOVA was conducted to investigate the differences between Turkey and China on the items of DBQ – Positive Behaviors. In all analyses, age, gender, and total mileage were taken as the control variables. The results showed that the two cultures have significant differences on seven of 14 items. Although the differences were significant for the majority of the items, the effect size of items showed variances from small to large. Based on the partial Eta square results, six items had small effect sizes, and only one item had large effect size. Among the six items with small effect sizes, Turkish participants scored higher than Chinese participants on two of the items (item 38, and item 42) namely; "Thank another driver for helping or showing consideration by waving your hand, sounding horn, etc." and "Pay attention to a puddle not to splash water on pedestrians or other road users". The four items that Chinese participants scored higher than Turkish participants were (item 32, item 33, item 39, and item 41) "Do not sound your horn to avoid noise", "Use your indicator to help the driver behind you whose view is not good enough for overtaking", "Let pedestrians cross the road even if it is your right of way", and "Do not sound your horn to avoid disturbing the driver in front waiting even after the traffic light has switched to green". In the item with large effect size (item 30), Chinese participants scored higher than Turkish participants. The item was "Give your right of way to another driver".

2.4.2.4.3. Factor-based comparisons – DBQ – Aberrant and Positive Behaviors

A series of ANCOVA was conducted to investigate the differences between Turkish and Chinese participants on the subscales of DBQ (i.e. violations, errors, and positive behaviors). In all analyses, age, gender, and total mileage were taken as the control variables. Among the three subscales, violations subscale showed significant differences between Turkish and Chinese drivers with small effect size. Turkish participants showed higher scores than Chinese participants. Errors subscale showed significant differences between Turkish and Chinese participants with large effect size. Chinese participants scored higher than Turkish participants. The difference for positive behaviors was not significant.

2.4.2.4.4. Gender-based comparisons – the DBQ – Aberrant and Positive Behaviors

A series of ANCOVA was conducted to investigate the gender differences in the DBQ. In all analyses, age and total mileage were taken as the control variables. The analyses were done separately for Turkish and Chinese samples. For the Turkish sample, only the difference between female and male drivers was significant for violations with medium effect size. Male participants reported higher violations than female participants. For the Chinese sample, only the difference between female and male drivers was significant for errors subscale with small effect size. Female drivers reported higher errors than male drivers.

When the item-based comparisons were taken into consideration with the results of PCA, two main patterns were observed. The first pattern was about the items related to violations. The items that Turkish drivers reported higher scores than Chinese drivers were mainly about violations. Especially, the items with higher effect sizes were about speeding, which indicates that Turkish drivers show speeding related violations more frequently than Chinese drivers. Moreover, factor-based comparisons also revealed that Turkish drivers show higher numbers of violations than Chinese drivers, Turkish drivers also reported that they perceive their traffic

environment as less functional than Chinese drivers. Additionally, based on the correlation analyses, functionality was negatively related to violations in Turkey. Hence, as traffic environment gets more functional, the violations might decrease in Turkey.

The second pattern was about the items related to errors. The items that Chinese drivers reported higher scores than Turkish drivers were mainly about errors. The factor-based comparisons also revealed that Chinese drivers reported higher numbers of errors than Turkish drivers. The difference based on required skills might have influence on the difference between frequencies of errors between the two samples. The internal requirements of traffic climate are about the required skills in traffic environment, and Turkish drivers perceived their traffic environment as requiring higher skills than Chinese drivers. Hence, due to higher skills, Turkish drivers might be less prone to show errors in traffic. Another possible explanation might be related to the higher scores of functionality in China. Road users who perceive their traffic context as functional perceive their traffic environment as less risky; which might cause to higher errors (Gehlert et al., 2014).

When the item-based comparisons were taken into consideration, Chinese drivers reported higher frequency for positive drivers than Turkish drivers in majority of the items. This difference can be explained by the collectivistic culture of China. In collectivist cultures, people are more able to define their self-image as we rather than I (Hofstede, 2001). When this information is considered in traffic context, Chinese drivers might think that they are not the only driver in traffic and try to behave accordingly.

Turkish drivers reported higher scores in violations factor and Chinese drivers reported higher scores in errors factor. As also discussed based on the findings of correlation analyses, the results are partially consistent with the literature (de Winter & Dodou, 2010); supporting the relationships between violations, younger age, male gender, and increased mileage in Turkish sample, and the relationship between errors and female gender in Chinese sample. The two dimensions that showed

differences between two samples, which were violations and errors, also showed significant differences between genders within that sample. In other words, violations were higher in the Turkish sample compared to Chinese sample, and Turkish male drivers showed higher numbers of violations than Turkish female drivers. Moreover, errors were higher in the Chinese sample, and Chinese female drivers showed higher numbers of errors than Chinese male drivers. Gender based comparisons showed similar patterns in country based comparisons for driver behaviors. Hence, it might be concluded that, gender based differences might have effects on country based differences.

2.4.2.5. Regression analyses

Hierarchical regression analyses were carried out to examine the relationships between traffic climate and driver behaviors. In all analyses, age, gender, and total mileage were entered in the first step as the control variables. In the second step, the subscales of TCS (i.e. external affective demands, functionality, and internal requirements) were entered. The analyses were conducted separately for the each subscale of DBQ (i.e. violations, errors, and positive behaviors) and for the two samples (i.e. Turkey and China).

In the Turkish sample, after controlling for the effects of age, gender, and total mileage, the subscales of the TCS explained a significant proportion of variance in driver behaviors in different patterns. External affective demands were positively and functionality was negatively related to violations. External affective demands were positively related to errors. Lastly, external affective demands were negatively and internal requirements dimension was positively related to positive driver behaviors. Taken together, external affective demands factor was the only dimension, which was significantly related to all types of driver behaviors. This finding highlights the importance of external affective demands in Turkish context.

In the Chinese sample, after controlling for the effects of age, gender, and total mileage, the subscales of TCS explained a significant proportion of variance in driver behaviors in different patterns. External affective demands were positively

and internal requirements were negatively related to violations. External affective demands were positively related to errors. Lastly, external affective demands were negatively and internal requirements were positively related to positive driver behaviors. Taken together, external affective demands factor was the only dimension, which was significantly related to all types of driver behaviors. This finding highlights the importance of the external affective demands in Chinese context.

When the relationships between traffic climate and driver behaviors were examined, both similarities and differences were observed between Turkey and China. External affective demands were the only factor that had relationships with all driver behaviors (i.e. violations, errors, and positive behaviors) in both Turkey and China. External affective demands had positive relationships with violations and errors. Based on the effect sizes, it might be suggested that these relationships were stronger in Turkey. As drivers perceive their traffic climate more externally demanding, they show more violations and errors. The same pattern between external affective demands and negative traffic related outcomes (e.g. accidents and violations) were also reported in the previous studies that were conducted in China (Chu et al., under review) and Germany (Gehlert et al., 2014). Considering the results of the current study and the previous literature, it might be inferred that higher external affective demands might have negative effects on a country's road traffic safety.

The similarities in the relationships between traffic climate and positive driver behaviors were observed both in Turkey and China. External affective demands had negative relationship with positive driver behaviors and internal requirements factor had positive relationship with positive driver behaviors. Based on the effect sizes, it can be suggested that, the stated relationships were stronger in China than Turkey. Previously, the relationship between traffic climate and positive driver behaviors was only examined in China (Chu et al., under review) previously and the results of the current study was in the same line, indicating a positive relationship between internal requirements and positive driver behaviors. Drivers who perceive the traffic

environment as more cognitively demanding show more positive driver behaviors. The negative relationship between external affective demands and positive driver behaviors means that drivers who perceive traffic environment as more emotionally demanding show less positive behaviors. Taken together, the less external affective demands and the higher internal requirement factors are experienced in traffic, more positive driver behaviors can be observed both in Turkey and China. In both cultures, the relationship between internal requirements and positive driver behaviors were stronger than the relationship between external affective demands and positive driver behaviors. Drivers might perceive, not the behaviors itself but being able to perform positive driving behaviors as a skill dimension in traffic context, which needs further research.

Two different patterns in the relationships between traffic climate and driver behaviors were observed both in Turkish and Chinese samples. First, in Turkey, drivers who perceive traffic as more functional reported fewer violations. Although the same relationship was reported in another study that was conducted in China (Chu et al., under review), in the current study, the relationship was not observed in the Chinese sample. When the demographic characteristics of the two studies were compared, the mean age showed differences. The mean age of the Chinese sample in the current study was 34.72 whereas in the other study it was 44.59 (Chu et al., under review). In both studies, age was negatively related to functionality. The inconsistent findings between two studies might be due to the differences in mean age of the two samples.

Second, in China, internal requirements were negatively related to violations. The finding was in the same line with the previous findings (Chu et al., under review; Gehlert et al., 2014; Zhang et al., 2018). As drivers perceived the traffic environment more cognitively demanding and requiring more skills, they reported fewer violations and aberrant behaviors. The differences between demographic variables of the two samples (i.e. Turkey and China) might be the possible explanation for the non-significant relationship in the Turkish sample. Younger age, male gender, and higher total mileage are strong predictors of violations (de Winter

& Dodou, 2010), which were among the characteristics of the Turkish sample. The reason of the higher violations in Turkey might be the demographic characteristics, rather than the perceived required skills in traffic environment.

The results of the regression analyses showed that two cultures have mainly same patterns, however it should be noted that, their effect sizes showed differences. In other words, when the effect sizes of the regression analyses for the two samples were investigated, similar patterns with different effect sizes were observed. To illustrate, both samples showed a significant relationship between external affective demands and aberrant driver behaviors (i.e. violations, and errors); however, the stated relationships were stronger in the Turkish sample. It might be inferred that external affective demands are closely related to aberrant driver behaviors in Turkey. Interventions and attempts to decrease external affective demands in traffic environment might have positive effects on road traffic safety in Turkey. The relationship between traffic climate and positive driver behaviors show a different pattern than aberrant driver behaviors. In other words, the relationship between traffic climate and positive drivers are stronger in the Chinese sample than Turkish sample. In China, the influences of traffic environment on positive driver behaviors might be stronger than its influences on aberrant driver behaviors. Turkey is a society that is high on harmony dimension of Schwartz's cultural values (2006). In these societies, people do not try to change the social environment but they try to adjust themselves. Hence, as they perceive their traffic environment more emotionally demanding, they might be more able to show violations. On the other hand, China is high on mastery dimension and in these societies people try to manipulate their social environment to achieve their self-assertion. Hence, they might be more prone to show positive driver behaviors to achieve self-assertion by trying to make things easier in traffic system.

2.4.3. Overall Discussion

Road traffic fatality rates show differences between Turkey and China. Turkey has a high rate, which is estimated as 8.9, and China has a higher estimated rate, which is

18.8 per 100 000 population (WHO, 2015). Although road traffic fatality rates show difference between Turkey and China, the patterns of the relationships between traffic climate and driver behaviors showed more similarities than differences. As traffic environment was perceived as more emotionally demanding in Turkey and China, the frequency of violations and errors increased, and the frequency of positive driver behaviors decreased, which are undesired outcomes for road traffic safety. As traffic environment is more cognitively demanding (higher internal requirements), more positive driver behaviors were reported, which is a positive outcome for road traffic safety. Addition to similarities, there are also some differences between the two samples. More functional traffic is desired to increase road safety in Turkey, whereas higher internal requirements are important to increase road safety in China (Chu et al., under review; Zhang et al., 2018). There are worldwide attempts to increase road safety by aiming to decrease traffic accidents and fatalities. However, these developments should be planned based on the differences among cultures and countries. In this way, the human factor might be included in the traffic system. To illustrate, requiring higher skills in traffic context might increase traffic safety in China; however it might not be effective in Turkey. Additionally, the demographic characteristics of drivers in a given country should be taken into consideration since they might be closely related to higher violations or errors in some cultures.

All in all, the findings supported the assumption that traffic environment of a country might influence drivers' driver behaviors in the given traffic context and the differences in driver behaviors might be about the differences in perceived traffic climate. In the current part of the study, the association between explicit attitudes towards traffic climate and self-reported driver behaviors were investigated. Explicit attitudes include conscious evaluations and they are open to biases. Hence, it is unknown whether the significant relationships were due to biased nature of self-report instruments. In order to understand the possible effects of social desirability and biases on these relationships, implicit attitudes towards traffic climate can be measured.

2.4.4. Limitations and Suggestions for Future Studies

The limitations of the current study were mainly about sampling and measurements. In both countries, snowball and convenience sampling approaches were used to collect data, which can be a limitation for the generalizability of the results. With snowball and convenience sampling approach, participants might be reached from limited number of cities, which might affect the generalizability of the results. In future studies, random sampling strategies can be used for data collection procedure to increase the generalizability of the results.

In the Study 1, only self-report measures were used, which may have caused common method bias. Using self-report methods to measure attitudes might affect results based on social desirability (Hoffman, Gawronski, Gschwendner, Le, & Schmitt, 2005). Attitudes can exist at two different levels: explicit attitudes and implicit attitudes. Explicit attitudes can be easily reported and consciously endorsed, and they are mainly measured with self-report measures. Implicit measures are uncontrollable and include unconscious evaluations (Fazio & Olson, 2003; Greenwald & Banaji, 1995; Wilson, Lindsey, & Schooler, 2000). In Study 1, drivers were asked about their perceptions about traffic climate with self-report measures. Their conscious evaluations might be affected from various experiences, and also perceptions about their own driving skills and driver behaviors that they usually perform. In order to examine drivers' unconscious evaluations about traffic climate, implicit attitudes and measures can be used in further studies.

Although self-report measures have many advantages, they are not lack of disadvantages (Lajunen & Özkan, 2011). Getting information about driver behaviors with self-report measures can be misleading or biased. The DBQ has items about both errors and violations. Errors are about unintentional aberrant driver behaviors and violations are about intentional aberrant driver behaviors. Drivers might not be aware of errors they make while driving since it is not intentional; hence it may not be possible for a driver to report their errors when asked (Lajunen and Özkan, 2011). In other words, "Unconscious errors may be hard to remember precisely because

they are unconscious" (Bjørnskau & Sagberg, 2005, p. 137). Additionally, the results might be affected from social desirability (Lajunen & Summala, 2003), especially for the questions about violations. Simulated driving and/or instrumented cars can be included in further studies to overcome the stated limitations.

CHAPTER 3

STUDY 2: EXPLICIT VERSUS IMPLICIT ATTITUDES: TRAFFIC CLIMATE

3.1. Introduction

It is assumed that traffic environment of a country that a driver mostly drives might influence a driver's behaviors in traffic context (Özkan & Lajunen, 2011). Both previous studies (e.g. Chu, Wu, Atombo, Zhang, & Özkan, under review; Gehlert et al., 2014; Özkan & Lajunen, unpublished) and Study 1 investigated the relationships between traffic climate and driver behaviors by using self-reports. The use of self-reports gives information about explicit attitudes towards a given object, however they do not give information about implicit attitudes. In Study 2, implicit attitudes towards traffic climate were measured for the first time in the literature. Hence, in study 2, both implicit and explicit attitudes towards traffic climate were measured. In addition to self-report of driving behaviors, speeding and lane positioning were also measured by driving simulator. The findings from the literature indicate that younger drivers show higher numbers of aberrant driver behaviors compared to older drivers (e.g. de Winter & Dodou, 2010; Martinussen et al., 2014; Sümer, Özkan, & Lajunen, 2006). Hence, it might be important to investigate young drivers' attitudes towards their traffic environment (i.e. traffic climate). The aim of the present study was to develop an implicit measure of traffic climate and compare the associations between explicit and implicit attitudes towards traffic climate and driver behaviors in a young driver sample.

3.1.1. Implicit Measures

Attitudes are about people's evaluations of an object with some degree of favor or disfavor (Ajzen, 2001). Attitudes are assumed to have a central role to understand human behavior (Kraus, 1995). They are helpful to organize and structure one's own experiences (Katz, 1960). When functions of attitudes are considered in traffic context, it can be suggested that road users' attitudes towards traffic climate include their information and expectations about traffic safety, which they use to evaluate traffic situations (Gehlert et al., 2014). Based on the association between attitudes and behaviors, the similar inference can be assumed for the relationships between traffic climate as attitude and driver behaviors as behaviors, which was also supported by the findings of previous studies (Chu et al., under review; Gehlert et al., 2014).

Attitudes can operate at two levels: explicit and implicit. Explicit attitudes are based on deliberate processes. They are reportable and include conscious evaluations. Explicit attitudes are people's own evaluations about an object. Self-report instruments are used to measure explicit attitudes and provide information about conscious representations of the objects. Since explicit attitudes include conscious judgments, they are open to biases (Hoffman, Gawronski, Gschwendner, Le, & Schmitt, 2005). On the other hand, implicit attitudes do not include introspection and people do not have control on them (Devos 2008; McKenzie & Gilmore 2017). Implicit measures give information about unconscious representations of the objects (Greenwald & Banaji, 1995). In implicit measures, participants respond to questions based on automatic association between their minds and the attitude object (Rudman, 2011), and people are not aware of these automatic associations. Hence, these automatic associations do not include judgments (Fazio & Olson, 2003), and it is assumed that they are less prone to get affected by social desirability (Gawronski, LeBel, & Peters, 2007). Implicit measures provide a way to reach unreportable evaluations of people, which are activated when a person is exposed to stimuli (Gawronski & Bodenhausen, 2006).

The most widely used implicit measure is the Implicit Association Test (IAT) developed by Greenwald, McGhee, and Schwartz (1998). The IAT is a simple sorting task that measures implicit associations between given terms and/or concepts in people's minds by using latency measures. In IAT, computer-based reaction time is calculated, and participants are asked to match concepts as quickly as possible. Quicker responses are given for the concepts, which are more closely associated in participants' brains. In the IAT, there are two different attitude objects (e.g. cats and dogs), and two opposing evaluative dimensions (e.g. positive vs. negative). The scores are calculated based on the comparisons of participants' response latencies for each association. The response latencies are about the rapid categorizations of the given objects with given evaluative dimensions. D-score is used to measure the strength of an association between given terms and/or concepts and it is calculated by the standardized mean difference of the 'hypothesis-inconsistent' and 'hypothesis-consistent' pairings (Greenwald, Nosek, & Banaji, 2003). Higher d-scores represent a stronger association between 'hypothesis-consistent' pairings, whereas higher negative d-scores represent a stronger association between 'hypothesis-inconsistent' pairings. Inquisit program uses the improved scoring algorithm (Greenwald et al., 2003) to calculate d-scores. To illustrate, cats can be ObjectA and dogs can be ObjectB, good terms can be AttributeA and bad term can be AttributeB. A positive d-score will reflect more positive attitudes towards cats than dogs and a negative d-score will reflect more positive attitudes towards dogs than cats.

Hoffman et al. (2005) conducted a meta-analysis and investigated the correlations between the IAT and self-report measures in 126 studies and reported the mean effect size as .24. The relationships between two different types of measures might be low due to several reasons. First, self-reports and explicit attitudes include motivational biases, and implicit attitudes are lack of these biases. Second, there might be other factors, which might affect the retrieval of information from memory about the given stimuli. Third, explicit attitudes might be affected by recently acquired evaluations. It is plausible to infer that, two types of measures point out, implicit and explicit attitudes are structurally distinct from each other (Greenwald &

Nosek 2009). Moreover, people can also have different explicit and implicit attitudes towards an object that is under question (Rydell & McConnell 2006; Wilson, Lindsey, & Schooler 2000).

In the literature, there are limited numbers of studies that used implicit measures to measure traffic related attitudes (Fulcher, Parkhurst, Alford, & Musselwhite, 2014; Harré & Sibley, 2007). Similar to studies that used both implicit and explicit measures in other areas, low correlations were reported for implicit measures of traffic related variables. In a study that measured attitudes towards risky and safe driving, and their relationships with self-reported driver behaviors and driving skills, low correlations were reported between implicit and explicit attitudes. Additionally, results showed differences between females and males (Martinussen, Sømhovd, Møller, & Siebler, 2015). In another study, attitudes towards speeding were measured both implicitly and explicitly. The findings suggested that both implicit and explicit attitudes towards speeding have positive correlations with violations. In addition, there was a significant low correlation between implicit and explicit attitudes towards speeding (Rusu, Sârbescu, Moza, & Stancu, 2017). Another traffic related variable that was measured implicitly was attitudes towards helmet-use. Implicit attitudes towards helmet use showed significant positive correlations with actual behavior and intention to use helmet (Ledesma, Tosi, Poo, Montes, & Lopez, 2015).

In the literature, attitudes towards driving skills were also tested both implicitly and explicitly. Öztürk (2017) suggested that explicit attitudes are related to self-reported driver behaviors and simulated driving behaviors, but implicit attitudes do not have significant relationships with driver behaviors. It should be noted that, the age range of the study was between 18-25, which are categorized as young drivers and a risky group in traffic. Bıçaksız, Harma, Doğruyol, Lajunen and Özkan (2018) also studied both implicit and explicit attitudes towards driving skills. The relationships between implicit and explicit attitudes towards driving skills and traffic related outcome variables showed different patterns, suggesting that explicit and implicit attitudes

towards driving skills might be different from each other and using different cognitive paths.

In IAT, two attitude categories (e.g., good vs. bad) and two evaluate categories (e.g., Turkey vs. China) are used. However, a person might not have an attitude towards one evaluate category that is in question. For instance, a person who lives in Turkey but has not been in China might not have attitudes towards China. Hence, it was suggested that, some research questions might require only measuring attitudes toward only one single evaluate category. Hence, The Single Category–Implicit Association Test (SC-IAT; Karpinski & Steinman, 2006) was developed to measure the association between two attitude categories (e.g., good vs. bad) in relation to a single evaluate category (e.g., Traffic). In the present study, SC-IAT was used to measure participants' attitudes towards traffic climate in Turkey.

3.1.2. Driving Simulator

Driving simulators are widely used in traffic related research (Carsten & Jamson, 2011). In simulation studies, the experience of the participants might be controlled by providing repeatable situations and scenarios, which is not possible with on-road tests. Moreover, simulator studies are less expensive than on-road tests and using driving simulators is a reliable driving assessment method (de Winter, Groot, Mulder, Wieringa, & Dankelman, 2009). It is assumed that the behaviors in driving simulators and actual driving behaviors show similarities, which supports the view that use of driving simulator is a reliable tool (Palat & Delhomme, 2016).

In driving simulator studies, mainly speeding (Bella, 2008; Helman & Reed, 2015; Öztürk, 2017), risk perception (Erkuş, 2017), obeying traffic lights (Meuleners & Fraser, 2015), and lane positioning (Meuleners & Fraser, 2015; Öztürk, 2017) have been studied. However, the studies investigating the relationships between simulated driving behaviors and the DBQ are limited. Helman and Reed (2015) examined the relationships between speeding in simulated driving and violations subscale of the DBQ and reported .38 to .48 correlations. In another study, the relationship between

drivers' speed in curve negotiation and violations subscale of the DBQ was investigated and findings suggested a positive significant relationship (Deng, Chu, Wu, He, & Cui, 2018). The studies focused on lane positioning did not examine its relationship with the DBQ, but it was suggested that traffic conditions (Brill, Shirkey, & Alberti, 2009; Mecheri, Rosey, & Lobjois, 2017), vehicle automation (Madigan, Louw, & Merat, 2018), playing games while driving (Postelnicu, Machidon, Girbacia, Voinea, & Duguleana, 2016), alertness (Larue, Rakotonirainy, & Pettitt, 2011), and road characteristics (Oron-Gilad & Ronen, 2007) might have influences on lane positioning. In the current study, means and standard deviations of speeding and lane positioning were taken as outcomes of simulated driving.

3.1.3. Aim of the Study

The explicit attitudes towards traffic climate and their relationships with self-reported driver behaviors have been studied in the literature. In the present study, addition to explicit attitudes towards traffic climate and self-reported driver behaviors, implicit attitudes towards traffic climate and driver behaviors in simulated driving were also examined. In the current study, the implicit attitudes towards traffic climate were measured for the first time in the literature. Additionally, the relationships between traffic climate and driver behaviors were tested only for young drivers for the first time. To understand the psychological processes behind the stated relationships, use of both explicit and implicit measures might provide more detailed information.

3.2. Method

3.2.1. Participants

Forty females and 40 males completed the test battery. The participants were reached by using convenience sampling. The target group included young drivers aged between 18-25 since they are the most risky group. The minimum total mileage requirement to be able to take part in the study was 2500 kilometers. The data was

checked for outliers in terms of total mileage and two participants were dropped. The remaining sample had 39 female and 39 male participants.

The age range was between 19 and 25. The mean age was 22.28 (*SD* = 1.64) and it was 22.44 (*SD* = 1.74) and 22.13 (*SD* = 1.53) for females and males, respectively. The average of driving experience in years was 3.68 (*SD* = 1.55). The mean of female participants' driving experience was 3.68 years (*SD* = 1.63), and the mean of male participants' driving experience was 3.69 years (*SD* = 1.49). The mean of total mileage was 33867.11 (*SD* = 35116.81). The mean of total mileage of female participants was 26181.58 (*SD* = 27305.70), and the mean of total mileage of male participants was 41552.63 (*SD* = 40407.68). Sample characteristics of the sample were presented in Table 22.

Table 22. Sample characteristics for factor analyses

Variables	Total Sample Turkey	Female	Male
N	78	39	39
Age			
Mean	22.28	22.44	22.13
SD	1.64	1.74	1.53
Driving experience			
Mean	3.68	3.68	3.69
SD	1.55	1.63	1.49
Total mileage			
Mean	33867.11	26181.58	41552.63
SD	35116.81	27305.70	40407.68

3.2.2. Measures

3.2.2.1. Traffic Climate Scale

The Traffic Climate Scale (TCS) was developed by Özkan & Lajunen (unpublished), consisting of 44 statements or adjectives that are related with possible situations in traffic. Participants were asked to express the degree items describe traffic in their country on a six-point scale (1 =does not describe it at all; 6 = very much describes it). The TCS has three factors: external affective demands, functionality, and internal requirements. Higher scores indicate higher perceptions

of the given statements or adjectives. The Cronbach's Alpha levels of the subscales were presented in the result section of the current study.

3.2.2.2. Driver Behavior Questionnaire

The Driver Behavior Questionnaire (DBQ) was developed by Reason et al. (1990) and it was adapted to Turkish by Sümer, Lajunen, and Özkan (2002). The scale is consisted of 28 items. The DBQ measures aberrant driver behaviors under four factors: ordinary violations, aggressive violations, errors, and lapses. Addition to aberrant driver behaviors, Özkan and Lajunen (2005) developed DBQ positive behaviors scale, consisting of 14 items, which aims to measure positive driver behaviors. In both scales, participants responded to items on a six-point scale (0 = never; 5 = always). Higher scores in a given factor represent higher frequency of the related behavior. The Cronbach's Alpha levels of the factors were presented in the result section of the current study.

3.2.2.3. Single Category Implicit Attitude Test – Traffic Climate

Inquisit 4.0 (Computer Software) was used for Single Category Implicit Attitude Test (SC-IAT) - Traffic Climate. The Single Category Implicit Association Test script adapted by Millisecond Software was used. The script was mainly based on the script written by Karpinski and Steinman (2006) and the general IAT.iqx script written by Millisecond Software LLC. In the present script, if the participants make a wrong matching, they have to correct it to move on.

The SC-IAT included two attitude categories (i.e. functional and not functional) and one evaluative category (i.e. Traffic). To determine the words that were used in the attitude categories, 44 items used in the TCS were adapted to one-word adjectives (e.g. Includes preventive measures - Preventive). Additionally, antonyms of each 44 item were listed (e.g. Preventive – Reactive). For each dimension of TCS (i.e. external requirements, internal requirements, functionality), a new script was written and in each script items from related dimensions were used. The items were listed according to their factor loadings that were obtained from previous studies (i.e.

Özkan & Lajunen, unpublished; Gehlert et al, 2014). In total, participants received one combined SC-IAT consisting of three tests (See Table 23).

SC-IAT had two stages and participants completed these stages randomly. In each stage, there was one practice part consisted of 24 practice trials and there was one test part consisted of 72 test trials. On the computer screen, the attitude categories (i.e. functional and not functional) were presented in the upper left and right corners of the screen and the evaluative category (i.e. Traffic) was presented under one of the attitude categories. In the middle of the screen, a word that represents either an attitude category or the evaluative category was appeared. In one of the two stages, (e.g. Traffic_Functional), participants pressed "E" key for traffic related words and good adjectives and will press "I" for bad adjectives. In the other stage, (e.g. Traffic_Not functional), participants pressed "E" key for traffic related words and bad adjectives and pressed "I" for good adjectives. Participants were asked to categorize the appeared words as quickly as possible. Before beginning each stage, a brief informative screen was displayed to the participants regarding the procedure of the next step.

The d-score represents the strength of the association between evaluative category (i.e. Traffic Climate) and attitude categories (i.e. functional and not functional). The d-scores, that are required for the analyses, were computed by the script automatically for each participant. The average of Block 2 (Traffic Climate & Functional) was subtracted from the average of Block 4 (Traffic Climate + Not Functional). Then, it was divided by the standard deviation of all given correct response times within block 2 and 4. Since Block 1 and 3 were the practice parts, they were not included in the calculation of the d-scores

Table 23. The Blocks of SC-IAT Traffic Climate

1st test EAD	**Type**	**Block**	**Trials**	**Left Corner**	**Right Corner**
1st stage	Practice	1	24	Not externally demanding or Traffic	Externally demanding
	Test	2	72	Not externally demanding or Traffic	Externally demanding
2nd stage	Practice	3	24	Not externally demanding	Externally demanding or Traffic
	Test	4	72	Not externally demanding	Externally demanding or Traffic
2nd test FUNC	**Type**	**Block**	**Trials**	**Left Corner**	**Right Corner**
1st stage	Practice	1	24	Functional or Traffic	Not-functional
	Test	2	72	Functional or Traffic	Not-functional
2nd stage	Practice	3	24	Functional	Not-functional or Traffic
	Test	4	72	Functional	Not-functional or Traffic
3rd test IR	**Type**	**Block**	**Trials**	**Left Corner**	**Right Corner**
1st stage	Practice	1	24	Not internally demanding or Traffic	Internally demanding
	Test	2	72	Not internally demanding or Traffic	Internally demanding
2nd stage	Practice	3	24	Not internally demanding	Internally demanding or Traffic
	Test	4	72	Not internally demanding	Internally demanding or Traffic

3.2.2.4. Driving Simulator

In both Study 1 and Study 2, aberrant driver behaviors were measured with a self-report instrument (i.e. DBQ). In study 2, addition to self-reports, aberrant driver behaviors were also measured by driving simulator. STISIM Drive M100W (STISIM Drive® Model 100 Wide Field-of-View Complete System) with the software of STISIM DRIVE-M100W-ASPT was used in the present study. A 22'' LCD monitor was used to display the driving scenario.

All participants completed a test scenario for driving simulator and they were asked whether they experienced motion sickness or not. The main scenario included a curved road. The road has one lane on each side of the road with incoming and going traffic. The road was 1900 meters. During 1900 meters, data was recoded in

each five meters. The data included lateral lane position and speeding. The speed limit for the curved road was 50 km/h.

3.2.3. Procedure

Ethical permission from the Research Center for Applied Ethics of Middle East Technical University was obtained. In order to reach young drivers, aged between 18-25, a flyer was prepared by researchers and posted on social media. The drivers who fulfill criteria and want to take part in the research sent e-mail to researchers to take an appointment. Participants, who took an appointment to take the test battery, came to ODTU – TSK MODSIMMER Human Factor Lab. They received the informed consent form. All participants agreed to take part in the study. Firstly, participants completed the test scenario for simulated driving and then, they were asked whether they experienced motion sickness or not. All participants declared that they were ready to continue to the study. Secondly, participants completed the surveys (i.e. demographic information form, TCS, DBQ). Thirdly, participant drove the experiment scenario in the driving simulator. Lastly, they completed the implicit association test. When they were done with the test battery, participants received the debriefing form and completed the payment form. Each participant received 60 TL for participating the study. The data was collected as a part of big research project.

3.3. Results

3.3.1. Principal Component Analyses

3.3.1.1. Traffic Climate Scale

The Principal component analysis (PCA) with Promax rotation technique was carried out. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .707 and the Barlett's test of sphericity that shows the correlation matrix produced by the items is factorable was significant ($df = 946$, $p < .001$). The number of factors was entered as three. The decision was given by considering the scree plot and the factor structure of the TCS in the previous studies (Özkan & Lajunen

unpublished; Chu et al., under review; Gehlert et al., 2014). The cut-off value for factor loadings was determined as .40 (Reise et al., 2000).

The first factor was composed of 16 items. The majority of the items were about functionality of the traffic environment. Hence the factor was named as "functionality". The communalities ranged between .233 and .712. The item with the highest communality value was "Planned". The initial eigenvalue of the first factor was 14.46 and explained 32.87% of the variance.

The second factor was composed of 18 items, which were about the internal requirements, required skills and abilities in traffic environments. Hence the factor was named as "internal requirements". The communalities ranged between .249 and .733. The item with the highest communality value was "Annoying". The initial eigenvalue of the second factor was 5.51 and explained 12.52% of the variance.

The third factor was composed of six items, which were about the emotional engagement in traffic environments. Hence the factor was named as "external affective demands". The communalities ranged between .192 and .681. The item with the highest communality value was "Mobile". The initial eigenvalue of the third factor was 2.70 and explained 6.14% of the variance.

Among 44 items, four items were eliminated. The item loading of item 3 and item 29 were below .40. Item 15 and item 43 loaded on both functionality and internal requirements factors. The PCA with promax rotation yielded a three-factor solution for the TCS with remaining 40 items. The three factors explained the 51.53% of the total variance (see Table 24).

Table 24. Factor loadings and communality values of the items of TCS

	Items	Components			Communality
		1 (Func)	2 (IR)	3 (EAD)	
1	Dangerous		**.561**		.495
2	Dynamic			**.733**	.600
3	Complicated				.464*
4	Aggressive		**.586**		.548
5	Exciting			**.677**	.533
6	Fast			**.662**	.506
7	Stressful		**.696**		.696
8	Monotonous			**-.417**	.192
9	Depend on luck	**-.463**			.332
10	Requiring you on the alert		**.632**		.486
11	Depends on fate			**.480**	.347
12	Requiring cautiousness		**.799**		.631
13	Requiring experience		**.888**		.656
14	Requiring quickness		**.911**		.686
15	Requiring you obey rules	.589	.572		.435**
16	What you done becomes a benefit to you	**-.536**			.446
17	Giving a feeling that you are worthless	**-.515**			.418
18	Mobile			**.825**	.681
19	Causing tension		**.552**		.629
20	Including preventive measures	**.800**			.576
21	Under enforcement	**.732**			.506
22	Travel easily from place to place	**.645**			.434
23	Depend on mutual consideration	**.632**			.398
24	Planned	**.833**			.712
25	Putting pressure on you		**.415**		.444
26	Directed to compensate the things that happened	**.480**			.233
27	Including deterring rules	**.679**			.483
28	Risky		**.403**		.429
29	Chaotic				.287**
30	Requiring patience		**.666**		.549
31	Making irritated		**.455**		.650
32	Requiring vigilance		**.848**		.612
33	Requiring skillfulness		**.876**		.613
34	Harmonious	**.703**			.529
35	Time consuming		**.401**		.462
36	Annoying		**.600**		.733
37	Egalitarian	**.682**			.531
38	Safe	**.717**			.602
39	Functional	**.724**			.512
40	Free flowing	**.685**			.555
41	Requiring knowledge of traffic rules	**.781**			.501
42	Directing your behaviors		**.516**		.249
43	Unpredictable	-.456	.548		.742**
44	Dense		**.577**		.554

Note: The cut-off value for factor loadings was determined as .40; *Items with loadings below .40.
**Cross-loaded items

3.3.1.2. Driver Behavior Questionnaire – Aberrant Behaviors

The PCA with Promax rotation technique was carried out. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .605 and the Barlett's test of sphericity that shows the correlation matrix produced by the items is factorable was significant (df = 378, p < .001). The number of factors was entered as two. The decision was given by considering the scree plot and the theoretical framework that the DBQ is based on (Reason et al., 1990). The cut-off value for factor loadings was determined as .40 (Reise et al., 2000).

The first factor was composed of 13 items, which were about aggressive and ordinary violations. Hence the factor was named as "violations". The communalities ranged between .184 and .574. The item with the highest communality value was "Disregard the speed limit on a residential road". The initial eigenvalue of the second factor was 4.20 and explained 15.01% of the variance.

The second factor was composed of 11 items. The majority of the items were about errors and lapses. Hence the factor was named as "errors". The communalities ranged between .189 and .476. The item with the highest communality value was "Miss "Give Way" signs, and narrowly avoid colliding with traffic having right of way". The initial eigenvalue of the first factor was 3.41 and explained 12.21% of the variance.

The PCA with promax rotation yielded a clear two-factor solution for DBQ in Turkish sample. Only four items (i.e. item 2, item 8, item 9, and item 13) were eliminated since their loadings were lower then the cut-off value, which was determined as .40. The two factors explained the 27.22% of the total variance (see Table 25).

Table 25. Factor loadings and communality values of the items of DBQ – Aberrant Behaviors

	Items	Component		Communality
		1 (Vio)	2 (Err)	
1	Hit something when reversing that you had not previously seen		**.560**	.321
2	Intending to drive to destination A, you "wake up" to find yourself on the road to destination B, perhaps because the latter is your more usual destination			.070*
3	Drive when you suspect you might be over the legal blood alcohol limit	**.438**		.209
4	Get into the wrong lane approaching a roundabout or a junction	**.454**		.225
5	Queuing to turn left onto a main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front		**.594**	.358
6	Fail to notice that pedestrians are crossing when turning into a side street from a main road		**.423**	.203
7	Sound your horn to indicate your annoyance to another road user	**.495**		.244
8	Fail to your rear-view mirror before pulling out, changing lanes etc.			.008*
9	Brake too quickly on a slippery road, or steer the wrong way in a skid			.124*
10	Pull out of a junction so far that the driver with right of way has to stop and let you out	**.501**		.345
11	Disregard the speed limit on a residential road	**.756**		.574
12	Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers		**.490**	.255
13	On turning left, nearly hit a cyclist who has come up on your inside			.134*
14	Miss "Give Way" signs, and narrowly avoid colliding with traffic having right of way		**.683**	.476
15	Attempt to drive away from the traffic lights in third gear (for manual cars)			
	Attempt to drive away from the traffic lights by pressing gas pedal with unintentional strong pressure (for automatic transmission car)		**.416**	.189
16	Attempt to overtake someone that you hadn't noticed to be signaling a right turn		**.444**	.211
17	Become angered by another driver and give chase with the intention of giving him/her a piece of your mind	**.516**		.277
18	Stay in a motorway lane that you know will be closed ahead until the last minute before forcing your way into the other lane	**.436**		.255
19	Forget where you left your car in a car park		**.585**	.355
20	Overtake a slow driver on the inside	**.700**		.495
21	Race away from traffic lights with the intention of beating the driver next to you	**.539**		.301
22	Misread the signs and exit from a roundabout on the wrong road		**.581**	.361

Table 25. (continued)

	Items	Component		Communality
		1 (Vio)	2 (Err)	
23	Drive so close to the car in front that it would be difficult to stop in an emergency	**.506**		.273
24	Cross a junction knowing that the traffic lights have already turned against you	**.425**		.184
25	Become angered by a certain type of driver and indicate your hostility by whatever means you can	**.448**		.227
26	Realize that you have no clear recollection of the road along which you have just been travelling		**.506**	.270
27	Underestimate the speed on an oncoming vehicle when overtaking		**.673**	.453
28	Disregard the speed limit on a motorway	**.474**		.223

Note: The cut-off value for factor loadings was determined as .40; * Items deleted.

3.3.1.3. Driver Behavior Questionnaire – Positive Driver Behaviors

The PCA with .30 cut-off value was conducted. The Kaiser-Meyer Olkin Measure that indicates the sampling adequacy was .527 and the Barlett's test of sphericity that shows the correlation matrix produced by the items is factorable was significant (df = 91, p < .001). The number of factors was entered as one. The decision was given by considering the scree plot and previous studies. The communalities ranged between .006 and .529. The item with the highest communality was "Give your right of way to another driver". The questionnaire included 14 items; however six items had item loadings lower than .30, which is the determined cut-off value. Hence, these six items were eliminated and eight items remained in the factor. The eigenvalue of the factor was 2.38 and it explained 16.99% of the total variance (see Table 26).

Table 26. Factor loadings and communality values of the items of DBQ – Positive Behaviors

	Items	Component	Communality
29	Do your best not to be an obstacle for other drivers.		.006*
30	Give your right of way to another driver.	**.727**	.529
31	Try to use less frequently your long lights not to disturb the oncoming drivers.		.073*
32	Do not sound your horn to avoid noise.	**.555**	.309

Table 26. (continued)

	Items	Component	Communality
33	Use your indicator to help the driver behind you whose view is not good enough for overtaking.		.063*
34	Avoid using the left lane not to slow down traffic on motorway.	**.415**	.172
35	Avoid close following not to disturb the car driver in front.		.002*
36	Adjust your speed to help someone trying to overtake.		.018*
37	Give up overtaking not to block the way of a car approaching behind.	**.602**	.362
38	Thank another driver for helping or showing consideration by waving your hand, sounding horn, etc.	**.449**	.202
39	Let pedestrians cross the road even if it is your right of way.	**.616**	.379
40	When parking your car, take into account other road users' needs for space.		.013*
41	Do not sound your horn to avoid disturbing the driver in front waiting even after the traffic light has switched to green.	**.387**	.150
42	Pay attention to a puddle not to splash water on pedestrians or other road users.	**.318**	.101

Note: The cut-off value for factor loadings was determined as .30; * Items deleted

3.3.2. Correlations between Study Variables

Correlations between the study variables, namely age, total mileage, external requirements, functionality, mobility, internal requirements, violations, errors, positive driver behaviors, the d-scores of the factors of SC-IAT (i.e. external requirements, functionality, and internal requirements), and four outcomes of driving simulator (mean speed, standard deviation of speed, mean lane positioning, and standard deviation of lane positioning) and the internal consistency reliability coefficients (i.e. Cronbach's Alpha) were presented in Table 27.

Age was significantly and positively related to total mileage (r = .32, p = .004). Being female was significantly and negatively related to positive driver behaviors (r = -.29, p = .010), mean speed in simulated driving (r = -.39, p = .001), and standard deviation of speed in simulated driving (r = -.26, p = .023), and positively related to mean lane positioning (r = .27, p = .017). Total mileage was significantly and positively related to violations (r = .36, p < .001), mean speed in simulated driving (r = .32, p = .004), standard deviation of speed in simulated driving (r = .25, p = .028), standard deviation of lane positioning in simulated driving (r = .28, p = .014),

and significantly negatively related to mean lane positioning in simulated driving (r = -.26, p = .023).

Self-reported external affective demands factor was significantly and positively related to self-reported functionality (r = .23, p = .044) and self-reported internal requirements (r = .23, p = .045). Self-reported functionality was significantly and negatively related to internal requirements (r = -.39, p < .001). Violations were significantly and positively related to mean speed in simulated driving (r = .56, p < .001), standard deviation of speed in simulated driving (r = .48, p < .001), standard deviation of lane positioning in simulated driving (r = .51, p < .000), and significantly negatively related to mean of lane positioning in simulated driving (r = -.53, p < .001). Errors were significantly negatively related to implicit functionality (r = -.26, p = .020). Implicit functionality factor was significantly and positively related to implicit internal requirements factor (r = .32, p = .004), and significantly negatively related to mean speed in simulated driving (r = -.22, p = .050), standard deviation of speed in simulated driving (r = -.26, p = .023), and standard deviation of lane positioning in simulated driving (r = -.26, p = .020).

Mean speed in driving simulator was significantly and positively related standard deviation of speed in simulated driving (r = .77, p < .001) and standard deviation of lane positioning in simulated driving (r = .75, p < .001), and significantly negatively related to mean lane positioning in simulated driving (r = -.75, p < .001). Standard deviation of speed in simulated driving was significantly negatively related to mean lane positioning in simulated driving (r = -.56, p < .001) and significantly positively related to standard deviation of lane positioning in simulated driving (r = .72, p < .001). Mean lane positioning in simulated driving was significantly negatively related to standard deviation of lane positioning in simulated driving (r = -.68, p < .001).

Table 27. Correlations between study variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Age	1														
2.	Gender	.10	1													
3.	N_TotalM	.32**	-.22	1												
4.	External	-.04	-.06	.07	1											
5.	Functionality	-.09	-.08	-.04	.23*	1										
6.	Internal	-.06	.12	-.06	.23*	-.39**	1									
7.	Violations	-.02	-.03	.36**	.09	.09	-.03	1								
8.	Errors	-.13	-.01	-.19	-.04	-.10	.09	.09	1							
9.	Positive	-.04	-.29**	.10	.09	-.06	.01	-.04	-.15	1						
10.	Ext_D	-.06	-.16	.02	.13	.18	-.03	-.16	-.06	-.01	1					
11.	Func_D	.04	.32**	-.08	-.02	-.04	.05	-.07	-.26*	.20	.14	1				
12.	Int_D	.08	.17	-.03	.02	.01	.14	-.01	-.09	-.08	.19	.32**	1			
13.	Speed_Mean	-.02	-.39**	.32**	.09	.03	-.08	.56**	.01	.16	.08	-.22*	-.08	1		
14.	Speed_SD	-.07	-.26*	.25*	.16	.09	-.11	.48**	.10	.13	.04	-.26*	-.10	.77**	1	
15.	Lane_Mean	-.08	.27*	-.26*	-.08	-.08	.20	-.53**	.01	-.16	-.07	.13	-.03	-.75**	-.56**	1
16.	Lane_SD	-.06	-.18	.28*	.10	.02	-.07	.51**	.04	.04	.11	-.26*	-.10	.75**	.72**	-.68**
	Cronbach Alpha				.46	.75	.93	.77	.75	.63						

Note: ** p <.01; * p <.05

3.3.3. Gender Differences

3.3.3.1. The subscales of TCS

The TCS consisted of three factors (i.e. external affective demands, functionality, and internal requirements). A series of ANCOVA was conducted to investigate gender differences on the three factors after controlling for age and total mileage. The difference between genders was not statistically significant for any of the factors after controlling for age and total mileage (see Table 28).

Table 28. Differences between genders on subscales of the TCS

Factors	df	Mean		F	p	η^2_p
		Female	Male			
External	1,73	3.93	3.97	.05	.827	.00
Functionality	1,73	3.01	3.11	.46	.502	.01
Internal	1,73	5.24	5.08	1.13	.292	.01

Adjusted means were presented

3.3.3.2. The subscales of SC-IAT – Traffic Climate

The SC-IAT – Traffic Climate consisted of three factors (i.e. external requirements, functionality, and internal requirements). A series of ANCOVA was conducted to investigate gender differences on the three factors after controlling for age and total mileage. The difference between genders was statistically significant for SC-IAT Functionality factor with medium effect size ($F(1, 74) = 7.73$, $p = .007$, $\eta^2_p = .10$). Female participants perceived traffic climate as implicitly more functional than male participants. The differences between genders were not significant for external affective demands and internal requirements factors (see Table 29).

Table 29. Differences between genders on SC-IAT - Traffic Climate

Factors	*df*	*Mean*		*F*	*p*	η^2_p
		Female	Male			
External	1,74	.04	.12	1.55	.217	.02
Functionality	1,74	.12	-.04	7.73	.007	.10
Internal	1,74	.18	.10	1.88	.175	.03

Adjusted means were presented

3.3.3.3. The subscales of the DBQ

The DBQ – Aberrant Behaviors consisted of two factors (i.e. violations and errors). The DBQ – Positive Driver Behaviors had only one factor. A series of ANCOVA was conducted to investigate gender differences on the three factors after controlling for age and total mileage. The difference between genders was only significant for positive behaviors with medium effect size ($F(1, 74) = 5.81$, $p = .018$, $\eta^2_p = .07$). Male participants reported higher frequency for positive behaviors than female participants. The difference between genders was not significant for violations and errors (see Table 30).

Table 30. Differences between genders on subscales of the DBQ

Factors	*df*	*Mean*		*F*	*p*	η^2_p
		Female	Male			
Violations	1,74	1.37	1.28	.52	.474	.01
Errors	1,74	.68	.71	.09	.771	.00
Positive	1,74	3.00	3.35	5.81	.018	.07

Adjusted means were presented

3.3.3.4. The outcomes of simulated driving

Four outcomes were used to investigate differences in simulated driving. These outcomes were mean speed in simulated driving, standard deviation of speed in simulated driving, mean lane positioning in simulated driving, and standard deviation of lane positioning in simulated driving. A series of ANCOVA was conducted to investigate gender differences on four outcomes after controlling for age and total mileage. The difference between genders was statistically significant for mean speed ($F(1, 74) = 8.90$, $p = .004$, $\eta^2_p = .11$) and mean lane positioning outcomes ($F(1, 74) = 4.07$, $p = .047$, $\eta^2_p = .05$). Male participants had higher mean speed scores than female participants with medium effect size, whereas female participants had higher mean lane positioning scores than male participants with small effect size, meaning that male drivers drove closer to the centerline. The differences between genders were not significant for standard deviations of speed and lane positioning scores (see Table 31).

Table 31. Differences between genders on simulated driving

Factors	df	Mean		F	p	η^2_p
		Female	Male			
Speed mean	1,74	61.04	71.50	8.90	.004	.11
Speed sd	1,74	12.62	15.54	2.80	.099	.04
Lane mean	1,74	1.57	1.42	4.07	.047	.05
Lane sd	1,74	.84	.90	.82	.370	.01

Adjusted means were presented

3.3.4. Regression Analysis

3.3.4.1. The relationships between TCS and DBQ

In order to test the relationships between traffic climate and driver behaviors, three hierarchical regression analyses were conducted. In all analyses, age, gender, and total mileage was entered in the first step as the control variables, and the three factors of TCS were entered in the second step (see Table 32).

In the first hierarchical regression analysis, violations were entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variables and the model was significant (R^2 = .12, F(3, 73) = 3.45, p = .021). Only total mileage was significantly and positively related to violations (β= .39, p = .002). The three factors of TCS were entered in the second step, however the model was not significant (ΔR^2= .01, F(6, 70) = 1.82, p = .107).

In the second hierarchical regression analysis, errors was entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variables; however the model was not significant (R^2 = .05, F(3, 73) = 1.20, p = .315). The three factors of TCS were entered in the second step; however the model was not significant (ΔR^2= .02, F(6, 70) = .78, p = .590).

In the third hierarchical regression analysis, positive driver behaviors were entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variable; however the model was not significant (R^2 = .09, F(3,

73) = 2.27, p = .088). The three factors of TCS were entered in the second step; however the model was not significant (ΔR^2= .01, F(6, 70) = 1.29, p = .275),

3.3.4.2. The relationship between SC-IAT Traffic Climate and DBQ

In order to test the relationships between SC-IAT Traffic Climate and driver behaviors, three hierarchical regression analyses were conducted. In all analyses, age, gender, and total mileage were entered in the first step, and the three factors of SC-IAT Traffic Climate were entered in the second step (see Table 33).

In the first hierarchical regression analysis, violations were entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variables and the model was significant (R^2 = .16, F(3, 74) = 4.60, p = .005). Total mileage was significantly and positively related to violations (β= .43, p < .001). The three factors of SC-IAT – Traffic Climate were entered in the second step and the model was significant (ΔR^2= .03, F(6, 71) = 2.77, p = .018). However, when the main effects of independent variables were investigated, none of them showed significant relationships with violations.

In the second hierarchical regression analysis, errors were entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variables; however the model was not significant (R^2 = .04, F(3, 74) = 1.07, p = .366). The three factors of SC-IAT Traffic Climate were entered in the second step; however the model was not significant (ΔR^2= .01, F(6, 71) =1.59, p = .164).

In the third hierarchical regression analysis, positive driver behaviors were entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variable; however the model was not significant (R^2 = .09, F(3, 74) = 2.33, p = .082). The three factors of SC-IAT Traffic Climate were entered in the second step, and the model was significant (ΔR^2= .11, F(6, 71) = 3.02, p = .011). Functionality was significantly and positively related to positive driver behaviors (β= .38, p = .002).

3.3.4.3. The relationship between TCS and Simulated Driving

In order to test the relationship between TCS and outcomes of simulated driving, four hierarchical regression analyses were conducted. In all analyses, age, gender, and total mileage were entered in the first step as the control variables, and three factors of the TCS were entered in the second step (see Table 34).

In the first hierarchical regression analysis, mean speed in simulated driving was entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variable, and the model was significant (R^2 = .22, F(3, 73) = 6.71, p < .001). Gender (being female) was significantly and negatively (β= -.31, p = .007) and total mileage was significantly and positively related to mean speed in simulated driving (β= .29, p = .017). The three factors of TCS were entered in the second step (ΔR^2= .01, F(6, 70) = 3.31, p = .006). The model was significant; however when the main effects of independent variables were investigated, none of the variables had significant relationships with mean speed in simulated driving.

In the second hierarchical regression analysis, standard deviation of speed in simulated driving was entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variable and the model was significant (R^2 = .12, F(3, 73) = 3.22, p = .028); however none of the control variables had significant relationships with standard deviation of speed in simulated driving. The three factors of the TCS were entered in the second step; however the model was not significant (ΔR^2= .03, F(6, 70) = 1.99, p = .079).

In the third hierarchical regression analysis, mean lane positioning in simulated driving was entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variable and the model was significant (R^2 = .12, F(3, 73) = 3.28, p = .026); however none of the control variables had significant relationships with mean lane positioning in simulated driving. The three factors of the TCS were entered in the second step; however the model was not significant (ΔR^2= .08, F(6, 70) = 2.10, p = .064).

In the fourth hierarchical regression analysis, standard deviation of lane positioning in simulated driving was entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variable, and the model was significant (R^2 = .12, F(3, 73) = 3.32, p = .025). Total mileage was significantly and positively related to standard deviation of lane positioning (β= .33, p = .010). The three factors of the TCS were entered in the second step; however the model was not significant (ΔR^2= .01, F(6, 70) = 1.77 p = .119).

3.3.4.4. The relationships between SC-IAT Traffic Climate and Simulated Driving

In order to test the relationship between SC-IAT Traffic Climate and outcomes of simulated driving, four hierarchical regression analyses were conducted. In all analyses, age, gender, and total mileage were entered in the first step, and the three factors of SC-IAT Traffic Climate were entered in the second step (see Table 35).

In the first hierarchical regression analysis, mean speed in simulated driving was entered as the dependent variable. Age, gender, and total mileage were entered in the first step as the control variable and the model was significant (R^2 = .21, F(3, 74) = 6.71, p < .001). Being female was significantly and negatively (β= -.32, p = .004) and total mileage was significantly and positively related to mean speed in simulated driving (β= .28, p = .017). The three factors of SC-IAT Traffic Climate were entered in the second step and the model was significant (ΔR^2= .01, F(6, 71) = 3.45, p =. 005). However when the main effects of independent variables were investigated, none of them showed significant relationships with mean speed in simulated driving.

In the second hierarchical regression analysis, standard deviation of mean speed in simulated driving was entered as the dependent variable. In the first step, age, gender and total mileage was entered in the first step as control variables and the model was significant (R^2 = .12, F(3, 74) = 3.33, p = .024). Total mileage was significantly and positively related to standard deviation of mean speed in simulated driving (β= .25, p = .041). The three factors of SC-IAT Traffic Climate were entered

in the second step, however the model was not significant (ΔR^2= .03, F(6, 71) = 2.14, p = .059).

In the third hierarchical regression analysis, mean lane positioning in simulated driving was entered as the dependent variable. In the first step, age, gender and total mileage was entered in the first step as control variables and the model was significant (R^2 = .12, F(3, 74) = 3.21, p = .028). Being female was significantly and positively related to standard deviation of mean lane positioning in simulated driving (β= .23, p = .047). The three factors of SC-IAT Traffic Climate were entered in the second step; however the model was not significant (ΔR^2= .01, F(6, 71) = 1.68, p = .138).

In the fourth hierarchical regression analysis, standard deviation of lane positioning in simulated driving was entered as the dependent variable. In the first step, age, gender and total mileage was entered in the first step as control variables and the model was significant (R^2 = .11, F(3, 74) = 3.06, p = .034). Total mileage was significantly and positively related to standard deviation of lane positioning in simulated driving (β= .30, p = .015). The three factors of SC-IAT Traffic Climate were entered in the second step and the model was significant (ΔR^2= .06, F(6, 71) = 2.44, p = .033). Among the SC-IAT Traffic Climate factors, only functionality was significantly and negatively related to standard deviation of lane positioning in simulated driving (β = -.24, p = .047).

Table 32. Hierarchical Regression Analysis on TCS and DBQ

	1. Violations					2. Errors					3. Positive behaviors				
Variables	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p
1. Demographic	.12	.12	3.45		.021	.05	.05	1.20		.315	.09	.09	2.27		.088
Age				-.13	.274				-.05	.714				-.06	.613
Gender				.06	.623				-.06	.645				-.25	.038
Total Mileage				.39	.002				-.20	.129				.09	.497
2. TCS	.13	.01	1.82		.107	.06	.01	.777		.590	.10	.01	1.29		.275
External				.03	.817				-.02	.855				.10	.444
Functionality				.10	.448				-.09	.495				-.11	.396
Internal				.02	.896				.05	.724				-.03	.834

Table 33. Hierarchical Regression Analysis on SC-IAT Traffic Climate and DBQ

	1. Violations					2. Errors					3. Positive behaviors				
Variables	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p
1. Demographic	.16	.16	4.60		.005	.04	.04	1.07		.366	.09	.09	2.33		.082
Age				-.16	.157				-.08	.533				-.03	.828
Gender				.08	.474				-.04	.771				-.28	.018
Total Mileage				.43	.000				-.17	.181				.04	.726
2. TCS	.19	.03	2.77		.018	.12	.08	1.59		.164	.20	.11	3.02		.011
External				-.18	.118				-.01	.929				-.11	.347
Functionality				-.04	.727				-.29	.023				.38	.002
Internal				.05	.657				-.01	.960				-.10	.373

Table 34. Hierarchical Regression Analysis on TCS and Simulated Driving

	1. Speed Mean					2. Speed SD					3. Lane Mean					4. Lane SD				
Variables	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p
1. Demographic	.22	.22	6.71		.000	.12	.12	3.22		.028	.12	.12	3.28		.026	.12	.12	3.32		.025
Age				-.10	.412				-.13	.293				-.01	.952				-.18	.154
Gender				-.31	.007				-.19	.112				.21	.081				-.08	.502
Total Mileage				.29	.017				.25	.054				-.23	.072				.33	.010
2. TCS	.22	.01	3.31		.006	.15	.03	1.99		.079	.15	.03	2.10		.064	.13	.01	1.77		.119
External				.07	.573				.16	.196				-.11	.388				.10	.408
Functionality				-.03	.801				-.01	.924				.03	.811				-.05	.687
Internal				-.06	.620				-.12	.359				.20	.137				-.10	.454

Table 35. Hierarchical Regression Analysis on SC-IAT Traffic Climate and Simulated Driving

	1. Speed Mean					2. Speed SD					3. Lane Mean					4. Lane SD				
Variables	R^2	ΔR^2	F	β	p	R^2	ΔR^2	F	β	p	R^2	R^2_{change}	F	β	p	R^2	ΔR^2	F	β	p
1. Demographic	.21	.21	6.71		.000	.12	.12	3.33		.024	.12	.12	3.21		.028	.11	.11	3.06		.034
Age				-.08	.469				-.13	.275				-.04	.748				-.15	.221
Gender				-.32	.004				-.19	.099				.23	.047				-.10	.370
Total Mileage				.28	.017				.25	.041				-.20	.107				.30	.015
2. TCS	.22	.01	3.45		.005	.15	.03	2.14		.059	.12	.01	1.68		.138	.17	.06	2.44		.033
External				.04	.738				.04	.748				-.03	.808				.13	.249
Functionality				-.12	.318				-.20	.110				.07	.561				-.24	.047
Internal				.01	.920				-.01	.945				-.08	.489				-.03	.810

3.4. Discussion

3.4.1. Overview

In Study 1, the relationships between traffic climate and driver behaviors were examined by using self-report instruments. In Study 2, addition to self-report instruments, implicit measures and driving simulator were also used. Implicit attitudes towards traffic climate were measured by newly developed "Single Category Implicit Association Test (SC-IAT) Traffic Climate" and driver behaviors were measured with driving simulator. Hence, in Study 2, the relationships between driver behaviors and traffic climate among young drivers were investigated by using different instruments. The differences in traffic climate and driver behaviors between female and male drivers were also examined.

The present chapter discusses the findings of Study 2 in the light of literature. Moreover, the limitations of the study, implications and suggestions for further research were presented.

3.4.2. Summary and Discussion of the Results

3.4.2.1. Principal component analysis on the Traffic Climate Scale and Driver Behavior Questionnaire

The PCA were carried out for the TCS, DBQ – Aberrant Behaviors and DBQ – Positive Behaviors that used in the present study. The TCS is consisted of 44 adjectives or statements. The DBQ – Aberrant Behaviors is consisted of 28 items and the DBQ – Positive Behaviors is consisted of 14 items.

The PCA for the TCS yielded a clear three-factor structure, in line with previous studies (Chu et al., under review; Gehlert et al., 2014; Özkan & Lajunen, unpublished). In the previous studies, the factors were named as external affective demands/requirements, functionality, and internal requirements. In the present study, since the factor structures were similar, the factor names used previously in the literature and also in Study 1 were re-used. External affective demands are about

emotional engagement that is required by all road users. Functionality dimension includes characteristics of safety and mobility and requirements for a functional traffic system. Internal requirements dimension includes skills and abilities of road users that are required while participating in traffic (Gehlert et al., 2014).

The nature of aberrant driver behaviors and positive driver behaviors are different, hence the PCA were conducted separately for DBQ – Aberrant Behaviors and DBQ – Positive Behaviors. First, PCA was carried out for the DBQ – Aberrant Behaviors. The results of the PCA yielded a clear two-factor structure, supporting the general theoretical structure of the DBQ. The first factor was called violations and the second factor was called errors. The two-factor structure of the DBQ was also supported by previous studies among different cultures (e.g. Martinussen et al., 2013; Özkan et al., 2006). Second, PCA was carried out for the DBQ – Positive Behaviors. The results revealed one factor structure, supporting the original one factor structure of the DBQ – Positive Behaviors (Özkan & Lajunen, 2005). Hence, the findings of the current study were in line with the previous findings, supporting the cross-cultural two-factor structure of the DBQ – Aberrant Behaviors, and one-factor structure of the DBQ - Positive Behaviors.

Although the results of PCA provided supportive findings for the three-factor structure of TCS, the items of factors showed differences with the items of factors in SC – IAT Traffic Climate. The factor structure of the SC – IAT was pre-determined before the data collection process based on the results of previous studies (Gehlert et al., 2014; Özkan & Lajunen, unpublished). When the items of factors were compared, the main differences were observed for external affective demands factor. The PCA of Study 2 showed that five items loaded on external affective demands, whereas there were 18 items in the same dimension of the SC – IAT Traffic Climate. Of these 18 items in SC - IAT, four items loaded on external affective demands factor of TCS, nine items loaded on internal requirements factor, three items loaded on functionality factor, and two items did not load on any factors. It might be suggested that, young drivers perceive some of the affects, which they might experience in traffic context, as feelings they have to cope with. In other words,

Turkish young drivers might perceive these affects as the ones requiring coping during driving; hence they might perceive these affects as "requiring coping skills".

The PCA results showed that, 18 items loaded on internal requirements factor, and there were 14 items in the same dimension of the SC _ IAT Traffic Climate. Of these 14 items, nine items loaded on the internal requirements factor of TCS, four items loaded on functionality factor, and one item did not load on any of the factors. Young drivers might perceive these four items (Item 22, Item 23, Item 27, and Item 41) as statements that make contribution to functionality of traffic context; rather than required personal skills and abilities.

The items with most similarity between the TCS and SC –IAT were about the functionality factor. The PCA showed that 16 items loaded on functionality, whereas there were 10 items in the same dimension of the SC –IAT Traffic Climate. Of these 10 items, nine of them loaded on functionality factor of the TCS and only one of them loaded on external affective demands. These differences and similarities between factor structures might suggest that, the traffic environment perception show differences. The similarities between the TCS and SC-IAT might be helpful to identify the core items of the TCS and its factors.

In the further analyses of Study 2, the TCS was used with three factors; namely external affective demands, functionality, and internal requirements. The DBQ – Aberrant Driver Behaviors was used with two factors; namely violations and errors. The DBQ – Positive Behaviors was used as one factor.

3.4.2.2. Correlation analyses

Total mileage was positively related to violations, mean speed, standard deviation of speed, and standard deviation of lane positioning, and negatively related to mean lane positioning. The relationship between total mileage and violations were also reported as positively in previous studies (see de Winter & Dodou, 2010). It was claimed that higher exposure to traffic might cause higher violations (Zhang, Jiang, Zheng, Wang, & Man, 2013). Among young drivers, violations also show increase

with age (de Winter & Dodou, 2010). The results of the current study support those claims and also suggest that even in an age-restricted group with limited experience, the relationship between mileage and violations is still apparent. Regarding the outcomes of simulated driving, findings suggested that drivers with higher total mileage showed higher mean speed, higher speed variance, and higher lane changing. It should be noted that, the road in simulated driving was one lane road, which might affected the drivers' preferences.

When the relationships between sub factors of traffic climate were investigated separately for implicit and explicit attitudes, different patterns were observed. The explicit attitudes towards functionality were positively related to external affective demands and negatively related to internal requirements, whereas implicit attitudes towards functionality and internal requirements were positively correlated, and it was in the opposite direction compared to explicit attitudes. This different pattern was an important finding, supporting the view that implicit and explicit attitudes might have different psychological processes (Hoffman et al., 2005). The distinction between implicit and explicit attitudes might be more obvious in functionality dimension. This dimension can be affected by some factors at national level. Functionality dimension includes items like "under enforcement" "includes deterring rules" which are about governance quality. Holding negative attitudes towards governance quality in general might affect explicit attitudes towards functionality; however at implicit level, drivers might perceive traffic climate as more functional since implicit attitudes are lack of biases and reflected automatically. Considering the item differences between factors of the TCS and SC –IAT Traffic Climate, which was due to the pre-determination of factor structure of the SC – IAT Traffic Climate, this opposite pattern in the relationships between dimensions should be investigated with caution.

Among the implicit and explicit attitudes of traffic climate and driver behaviors, only implicit attitude towards functionality was negatively correlated with errors, mean speed, standard deviation of speed, and standard deviation of lane positioning. Drivers who perceive traffic as implicitly more functional reported lower numbers

of errors in self-report measures, and showed lower speed, less speed variance and less variance in lane positioning in simulated driving. In the literature, explicit attitudes towards functionality dimension were mainly related to violations (Chu et al., under review; Gehlert et al., 2014); however the findings of the current study showed that implicit attitudes towards functionality was related with errors. Errors are about performance limits of the drivers', including attentional abilities. More functional traffic environment might be helpful for driver to pay more attention to traffic, which in turn might decrease the number of errors.

When the correlations between the sub factors of DBQ and outcomes of simulated driving were investigated, self-reported violations were positively correlated with mean speed, standard deviation of speed, and standard deviation of lane positioning, and negatively correlated with mean lane positioning. Drivers who reported higher numbers of violations in DBQ showed higher mean speed, speed change and lane changes. Similar to previous findings, objectively measured speed related variables were related to violations subscale of the DBQ (Helman and Reed, 2015). It can be argued that, similar to speed choice, lane positioning might be also intentional.

3.4.2.3. Gender-based comparisons – Traffic Climate

A series of ANCOVA was conducted to investigate the gender differences in the subscales of TCS. In all analyses, age and total mileage were taken as the control variables. However, the differences for genders in the subscales of TCS were not significant.

A series of ANCOVA was conducted to investigate the gender differences in the subscales of SC – IAT – Traffic Climate, which was used as an implicit measure for traffic climate. In all analyses, age and total mileage were taken control variables. Among the subscales, only functionality dimension showed significant differences between genders with medium effect size. Female drivers perceived traffic climate more implicitly functional than male drivers.

Taken together the findings of the implicit and explicit attitudes towards traffic climate, gender based differences was only significant for implicit attitudes towards functionality. Since the difference was not significant for the explicit attitudes, it might be suggested that explicit and implicit towards functionality might be different from each other. This pattern might support the idea that people can hold different implicit and explicit attitudes towards a given object (Rydell & McConnell 2006; Wilson, Lindsey, & Schooler 2000), which is traffic climate in Turkey in Study 2.

3.4.2.4. Gender-based comparisons – Driver Behaviors

A series of ANCOVA was conducted to investigate the gender differences in the subscales of DBQ. In all analyses, age and total mileage were taken as the control variables. In the literature, violations and errors show differences between genders (de Winter & Dodou, 2010); however the results of the current study showed gender differences only for positive driver behaviors. Male drivers reported higher frequency for positive driver behaviors than female drivers. This difference between genders in a young driver sample needs further investigation since previous studies reported contradictory findings; such as non-significant correlations between gender and positive driver behaviors (Bıçaksız & Özkan, 2016; Chu et al., under review; Guého, Granié, & Abric, 2014; Özkan & Lajunen, 2005) and higher positive behaviors for female drivers than male drivers (Shen, Qu, Ge, Sun, & Zhang, 2018). In Study 1, it was suggested that, being able to show positive driver behaviors might be perceived as a skill dimension. In the literature, male drivers reported higher perceptual-motor skills than female drivers (e.g. Özkan, Lajunen, Chliaoutakis, Parker, & Summala, 2006b; Martinussen, Moller, & Prato, 2014). Additionally, when measured both implicitly and explicitly, men showed higher driving self-enhancement than women (Harre & Sibley, 2007; Sibley & Harre, 2009). If drivers perceive being able to show positive driver behaviors as a skill dimension, it might be plausible to expect that male drivers might also have higher self-enhancement for positive behaviors. This assumption needs further investigation in future research.

A series of ANCOVA was conducted to investigate the gender differences in the outcomes of simulated driving. In all analyses, age and total mileage were taken as the control variables. Mean speed in simulated driving showed significant differences between genders with medium effect size. Male drivers drove faster than female drivers. In the literature, young male drivers are regarded as riskier compared to female drivers based on their higher numbers of accidents, violations (Amarasingha and Dissanayake, 2014), more speeding (Hassan & Abdel-Aty, 2013; Laapotti & Keskinen, 2004; Laapotti Keskinen, Hatakka, & Katila, 2001). Lane positioning in simulated driving also showed significant differences between genders with small effect size. In other words, male drivers drove closer to the centerline and even pass more than female drivers. This difference might be due to the characteristics of the road, which was one lane for each direction. During the scenario, there were also other cars going with different speeds, and that might cause male drivers change lanes to overtake.

3.4.2.5. Regression analyses

The hierarchical regression analyses were conducted in order to examine the relationships between traffic climate and driver behaviors. In all analyses, age, gender, and total mileage were entered in the first step as the control variables. In the second step, the subscales of TCS (i.e. external affective demands, functionality, and internal requirements) or the subscales of SC – IAT – Traffic Climate (i.e. external affective demands, functionality, and internal requirements) were entered. The analyses were conducted separately for the each subscale of DBQ (i.e. violations, errors, and positive behaviors) and for each outcome of simulated driving (i.e. mean speed, standard deviation of speed, lane positioning, and standard deviation of lane positioning).

First, the relationships between explicit attitudes towards traffic climate and self-reported driver behaviors were investigated. However none of the relationships were significant. Second, the relationships between implicit attitudes towards traffic climate and self-reported driver behaviors were investigated. Among the

dimensions, only implicit attitudes towards functionality were significantly and positively related to positive driver behaviors, meaning that as drivers perceive traffic climate implicitly more functional, more positive driver behaviors were reported. In the current study, implicit attitudes towards functionality and internal requirements were positively correlated. Internal requirements are mainly about the skills and abilities that are required in traffic context. Hence, based on the positive associations, it might be claimed that, being able to show positive drivers might be perceived as a skill dimension. In the first part of the study, findings also suggested that positive driver behaviors might be perceived as a skill dimension. Based on the positive correlation between implicit attitudes towards functionality and internal requirements, the assumption in Study 1 can be partially supported.

Third, the relationships between explicit attitudes towards traffic climate and objective measures of driver behaviors were investigated. However, none of the relationships were significant. Lastly, the relationships between implicit attitudes towards traffic climate and objective measures of driver behaviors were investigated. Among the dimensions, only implicit attitudes towards functionality dimension were significantly and negatively related to standard deviation of lane positioning; meaning that, as drivers perceive traffic climate implicitly more functional, they showed less variance in their lane positioning. In other words, perceiving the traffic climate implicitly more functional might be related with less lane changing.

Considering the findings, although the results were non-significant for the explicit attitudes towards traffic climate, the differences between implicit and explicit attitudes towards traffic climate might be an important finding to consider in attempts to improve road traffic safety. Implicit and explicit attitudes have different psychological processes and based on the results, it can be suggested that young drivers hold different explicit and implicit attitudes towards functionality of traffic climate in Turkey. Implicit attitudes might be more important for spontaneous decision-making, whereas explicit attitudes might be more important for deliberate behaviors (Perugini, 2005; & Rydell & McConnell, 2006). Driving mostly includes

spontaneous decisions since it is a complex system and requires immediate reactions (e.g. using an indicator), whereas there are also behaviors which are mainly about planning and require deliberate behaviors (e.g. parking, planning to from point A to point B) (Davies, Lee, & Falkmer, 2011; Ernst & Paulus, 2005). In order to make interventions in spontaneous decisions for driving, interventions that directly aim to change implicit attitudes might be more effective. To exemplify, In Study 2, implicit attitudes towards functionality was related to positive driver behaviors, and these behaviors also require spontaneous decision-making, such as "Let pedestrians cross the road even if it is your right of way", "Give your right of way to another driver". Implicit attitudes towards functionality had significant relationships only with positive driver behaviors, and also had significant zero-order correlations with errors. In order to develop an intervention for specific behaviors, the relationships between implicit attitudes towards traffic climate and driver behaviors can be examined with item based analyses. It should be considered that, implicit attitudes change slowly by using substantial amounts of counter attitudinal information (Rydell & McConnell, 2006). Since implicit attitude change requires long time, systematic interventions can be applied in driving schools during trainings. Additionally, priming techniques can be used to change implicit attitudes (Rydell & McConnell, 2006). Hence, in order to change implicit attitudes towards traffic climate, priming techniques can also be used.

3.4.3. Overall Discussion

All in all, the findings partially supported the assumption that traffic climate of a country might influence drivers' behaviors in the given traffic context and the differences in driver behaviors might be about the differences in perceived traffic climate. In Study 2, drivers' explicit and implicit attitudes towards traffic climate were measured and their relationships with driver behaviors were examined separately. Previously in the literature, it was suggested that, people might hold different explicit and implicit attitudes towards a given object (Rydell & McConnell 2006; Wilson, Lindsey, & Schooler 2000), and findings of the present study supported this claim by showing that only implicit attitudes towards functionality of

traffic climate was related to driver behaviors. Also, the opposite correlations between implicit and explicit attitudes towards functionality and internal requirements might be supportive for this claim.

Based on the demographic variables of Study 2, male young drivers had higher exposure (i.e. total mileage) than female young drivers and male drivers showed higher mean speed in simulated driving. In simulated driving, male drivers drove closer to the centerline compared to female drivers, which might be interpreted as higher overtaking tendency during the driving. The speed limit was set as 50 km/h for the simulator scenario, and both female and male drivers drove above the speed limit, with male drivers speeding higher than female drivers. The literature suggests that gender and driving experience are closely related to performance in driving simulators. Young male drivers with higher experience showed more speeding in their driving simulator performance compared to female drivers and drivers with less (Taubman-Ben-Ari et al., 2016). In traffic related research, exposure is an important variable. It can be described as "the degree to which a driver exposes him- or herself to traffic", and it is also about "the probability of being involved in an accident" (Özkan & Lajunen, 2011). It was suggested that, an average male driver has higher miles experience than an average female driver has (Stradling & Parker, 1996). Drivers who drive more frequently, which can also be described as higher exposure, obey traffic rules less compared to drivers with lower exposure. In a meta-analysis by de Winter and Dodou (2010), violations were found as a strong predictor of accident involvement in young drivers compared to older drivers. Violations showed decrease with age when drivers from all age groups were investigated; however as an important finding, among young drivers, violations increased with age. There are also studies reporting higher levels of violations among novice drivers (Guého et al., 2014; Özkan et al., 2006, Reason et al., 1990; Rowe, Roman, McKenna, Barker, & Poulter, 2015). Taken together, in their study, younger age, being male, and increased exposure (mileage) were related to higher violations. The findings of Study 2 were also in line with the findings of the literature, when the findings of the simulated driving were considered. The results highlight the

importance of focusing on young drivers in order to increase road safety and decrease number of accidents and fatalities.

In the literature, only explicit attitudes towards traffic climate were examined (Chu et al., under review; Gehlert et al., 2014; Özkan & Lajunen, unpublished). In the current study, implicit attitudes towards traffic climate were measured for the first time. Additionally, in the previous studies (Chu et al., under review; Gehlert et al., 2014; Özkan & Lajunen, unpublished), traffic climate was measured for drivers from all ages and in the current study, only young drivers' traffic climate attitudes were measured both implicitly and explicitly for the first time. As previously suggested, sub factors of traffic climate (i.e. external affective demands, functionality, and internal requirements) and driver behaviors were related and these relationships might show differences in different cultures. For instance, in German sample, internal requirements were negatively and external affective demands and functionality were positively related to accidents. As drivers perceived traffic climate less internally demanding (i.e. internal requirements) and more functional, they were more likely to report traffic violations. In other words, in German sample, as the traffic climate was perceived more positive, more aberrant behaviors were reported (Gehlert, et al., 2014). The relationship between traffic climate, driver behaviors and accident involvement were studied in China (Chu et al., under review). Internal requirements and functionality dimensions were negatively related to aberrant driver behaviors. Additionally, internal requirements, functionality were positively related to positive driver behaviors. In both countries, as drivers perceived traffic climate as more externally affective demanding and less internally demanding, they reported more violations. The results of the stated two studies showed differences for the functionality dimension of traffic climate. Functionality was negatively related to violations in China, whereas it was positively related to violations in Germany.

As the previous findings are compared with the results of the current study, results might be interpreted as contradictory. In the current study, the relationships between explicit attitudes towards traffic climate and driver behaviors were non-significant.

However, the age range of the current study was restricted since the aim was to investigate the young drivers' attitudes towards traffic climate and their relationships with driver behaviors. The young drivers' implicit attitudes towards traffic climate highlights the importance of functionality dimension, suggesting that implicit attitudes towards functionality were positively related to positive driver behaviors and negatively related to variance in lane keeping after controlling for the effects of age, gender, and total mileage. Also, the zero-order correlations showed that implicit attitudes towards functionality were negatively related to frequency of errors. The similar pattern for the explicit attitudes towards functionality of traffic climate was observed in China (Chu et al, under review). Young drivers implicit attitudes towards functionality can be considered as an important variable to increase road safety.

Implicit attitudes towards traffic climate were examined for the first time in the literature. Hence, it might be a good starting to point to focus on studies that included implicit attitudes towards driving skills to interpret the results of the current study. Martinussen et al. (2015) suggested that implicit attitudes towards safe driving might be influenced from driving experience (Martinussen et al., 2015). In the current sample, the level of experience was low due to age restriction. In another study conducted with young drivers (Öztürk, 2017) that examined the relationships between both explicit and implicit attitudes towards driving skills and driver behaviors, results were significant mostly for explicit attitudes towards driving skills, but non-significant for implicit attitudes towards driving skills. However in the current study, explicit and implicit attitudes towards traffic climate showed opposite patterns, providing significant results for implicit attitudes (partially) but non-significant results for explicit attitudes. The possible explanation about the opposite patterns might be about the contents of the variables. Attitudes towards driving skills are about the self, whereas attitudes towards traffic climate is about the whole traffic system (Özkan & Lajunen, unpublished); including all road users, enforcements, required skills, and affects that can be faced in traffic context. Hence, it might be argued that, young drivers might develop explicit attitudes about the self-

related variables with their first years of driving; however it might require more time to develop explicit attitudes towards to whole traffic environment. Additionally, when the characteristics of sub factors of traffic climate are investigated, external affective demands and internal requirements might be more abstract and functionality might be more concrete. In other words, functionality dimension includes characteristics of safety and mobility and requirements for a functional traffic system (Gehlert et al., 2014), which are represented with items as "including preventive measures", "under enforcement", "planned", and "including deterring rules". This relatively concrete nature of functionality dimension might be a possible explanation of significant results for implicit attitudes towards functionality. The directions of the findings suggested that positive implicit attitudes towards functionality are desired for safe traffic environment. Hence, interventions that aim to increase functionality in traffic climate might be a good starting point to increase road safety especially for young drivers.

When explicit and implicit attitudes are compared, explicit attitudes are rapidly gained and they might change faster compared to implicit attitudes, whereas implicit attitudes are acquired by long-term socialization experiences; hence change in implicit attitudes might take longer time, and show resistance to change (Brinol, Petty, & McCaslin, 2009; Gregg, Siebt, & Banaji, 2006; Petty, Tormala, Brinol, & Jarvis, 2006). Explicit attitudes are less stable compared to implicit attitudes (Brinol et al., 2009). There are findings indicating the instable nature of explicit attitudes (Cohen & Reed, 2006). It was suggested that, explicit attitudes might change due to direct experience with the object. Attitudes are helpful to organize new information; and people might adjust their attitudes accordingly as they receive new information. When direct experience with the object is considered for traffic environment, it might be plausible to expect instable attitudes towards traffic climate among young drivers. Traffic is an open system and drivers might face with new experience each day. In order to form more stable attitudes and organize these experiences in their minds, drivers might need more experiences.

The results of the current study suggested that, explicit attitudes towards external affective demands, functionality, and internal requirements, and implicit attitudes towards external affective demands and internal requirements might not have been formed due to their low experience and exposure to traffic environment. The attitude formation process can be examined in further research with a longitudinal study. Additionally, it might be important to make interventions in the first years of driving, and even in driving schools. Özkan et al. (2013) suggested that implicit measures might be used for different groups of drivers. Hence, the attitudes towards traffic climate in young professional drivers might be also studied in future research.

3.4.4. Limitations and Suggestions for Future Studies

The limitations of Study 2 were mainly about the instruments, demographic variables of the sample, and the sample size. Self-report measures and driving simulators might have disadvantages since they might not give the best information related to actual driver behaviors (Carsten & Jamson, 2011; Lajunen & Summala, 2003; Lajunen & Özkan, 2011). The self-reports are open to biases, both for measuring driver behaviors and traffic climate. In driving simulators, the participants might have the feeling of being observed since the study takes place in a laboratory, which might be about compliance bias (Carsten & Jamson, 2011). It was claimed that driver drive faster in simulation condition than on-road tests (Yang, Overton, Han, Yan, & Richards, 2014), which might be a result of damage-free nature of driving simulators. When interpreting the results, disadvantages and advantages of both measurement types should be taken into consideration.

The association between traffic climate and driver behaviors has never been studied in a young driver sample. Additionally, it was the first study that measured both implicit and explicit attitudes towards traffic climate. Results suggested that, drivers might have different explicit and implicit attitudes towards traffic climate; and young drivers might need more experience to form attitudes towards traffic climate. Hence, in future studies young professional drivers might be also included to make comparisons.

There are different types of implicit instruments to measure implicit attitudes. Bar-Anan and Nosek (2014) compared seven implicit attitude measures and showed that both the relationships between implicit measures and their relationships with self-reports were significant. The research focused on self-esteem, race, and politics subjects, and results showed different patterns for each subject showing weak relations for self-esteem, moderate for race, and strong for politics. Hence, the variance in relationships might be due to the concepts, rather than the used measurement. When these findings are considered for attitudes towards traffic climate, implicit attitudes might be measured with more than one type of implicit measures and with different age groups and different road type groups.

The PCA were conducted both for the TCS and DBQ. However, in order to develop SC – IAT, in the first place, the items for external affective demands, functionality, and internal requirements had to be determined. Due to this pre-determination, the items of the factors for implicit and explicit attitudes towards traffic climate showed differences. In future studies, the implicit measurements can be developed by also considering the results of the current study.

Lastly, the number of sample size was limited. Only 40 female and 40 male drivers participated the current study. In future studies, the sample size can be larger, and also from different road user groups in order to avoid possible problems in analyses.

CHAPTER 4

OVERVIEW

4.1. General Discussion

This part of the current study aims to discuss the findings of both Study 1 and Study 2. In Study 1, the relationships between explicit attitudes towards traffic climate and self-reported drivers behaviors were examined. Additionally, the relationships were investigated cross-culturally between Turkey and China. In Study 2, both implicit and explicit attitudes towards traffic climate and their relationships with both self-reported driver behaviors and outcomes of simulated driving were examined in a young driver sample. The implicit test for traffic climate was developed for the first time.

The comparisons of PCA of TCS for Turkish and Chinese samples showed that, some items loaded on different factors and these items were mainly about negative affects that might be experienced in traffic context. These items that showed differences loaded on internal requirements factor in the Turkish sample, whereas they loaded on external affective demands factor in the Chinese sample. This pattern might imply that Turkish drivers perceive those affects as they have to cope with in traffic context. In other words, Turkish drivers might perceive these affects as the ones requiring coping skills. This difference can be explained by cultural differences between Turkey and China. China has a higher score than Turkey in mastery dimension. In high mastery societies, people give more importance to manipulation of the natural and social environment. Since drivers in China might try to manipulate the social environment, they might externalize the affects they experience in traffic environment. Another cultural difference between Turkey and China is about the harmonic dimension. Turkey is considered as a harmonic culture compared to

China. Based on this information, it can be claimed that, in Turkey, people might try to accept and fit into the social world rather than try to change it. Hence, Turkish drivers might have internalized some of the negative affects they face in the traffic context; and they perceive these affects that they have to cope with. Taken together, the underlying reasons of differences between factor loadings for the stated items can be summarized with the harmonic perspective of Turkish drivers and high score of China in mastery dimension.

In the Study 1, the PCA for TCS was conducted with a group of Turkish drivers between the ages of 19 and 61. In the Study 2, the age range of Turkish drivers were 19-25 since the focus was on young drivers. The results suggested that ten of the 44 items loaded on different factors between the two groups. The PCA with drivers from all ages implies that these items are mostly perceived as "internal requirements", whereas young drivers are tend to perceive these items as more about functionality. The reason of differences among Turkish drivers (i.e. Study 1 Turkish sample and Study 2) might be about differences in age range. Although there were differences between factor loadings of items, there were also items that consistently loaded on the same factors in all three PCA. These similarities suggest that each factor has its own core items. The identification of core items of TCS might be important to overcome age related differences since the TCS was developed for all age groups. A shorter version of the TCS can be developed with these core items and validated cross-culturally.

Similar to the differences and similarities in the factor structures of the TCS, the relationships between traffic climate and driver behaviors also suggested similarities and differences between cultures, age groups, and measurement methods. Firstly, based on the findings of the Study 1, it can be claimed that external affective demands are positively related to violations, errors, and negatively related to positive driver behaviors in both Turkey and China. As drivers perceive traffic climate more emotionally demanding, they report higher violations and errors, and lower positive driver behaviors, meaning that higher external affective demands dimension might have negative effects for road traffic safety. In the new strategies

that will include human factor, external affective demands might require more focus since it is the only dimension that has relationships with all types of driver behaviors. Regarding the positive relationship between internal requirements and positive driver behaviors in both Turkey and China, it can be suggested that drivers might perceive performing positive driver behaviors as a skill dimension in traffic.

Regarding the differences between two cultures, firstly, in Turkey, functionality was negatively related to violations. The mean age of Turkish sample was lower than Chinese sample; and age was negatively correlated to functionality in both cultures. The difference between mean ages of the samples might be related with the different findings between the two samples. Secondly, in China, internal requirements were negatively related to violations. Since younger age and higher mileage are strong predictors of violations (de Winter and Dodou, 2010), higher violations in Turkey might be due to the demographic characteristics of Turkish sample, rather than the perceived required skills in traffic context. Considering both the similarities and differences between two cultures, it might be claimed that, traffic climate of a country might influence drivers' behaviors; and differences in driver behaviors might be explained with both the differences in the relationships and demographic characteristics of driver samples. For road safety attempts in Turkey, functionality is an important variable to focus on compared to China, and for China, internal requirements are important to focus on compared to Turkey.

When the relationships between sub factors of traffic climate were investigated, the relationships between functionality and internal requirements differ on their directions between Turkey and China. In Turkey, as drivers perceive traffic climate more functional, they perceive traffic climate as less internally demanding. In other words, as drivers perceive traffic climate less functional, they perceive it as more cognitively demanding and requiring higher skills. However in China, as drivers perceive traffic climate more functional, they perceive it as more internally demanding. When this finding is combined with the comparisons between Turkey and China on the TCS factors, it can be seen that, Turkish drivers perceive their traffic context as less functional and more internally demanding than Chinese

drivers. In Turkish sample, driving related self-enhancement bias might be higher and causing this difference. In Turkish context, drivers might attribute the reasons for positive traffic climate to being skillful as a driver, rather than the functionality of the traffic system. The differences in the dimensions might influence the direction of the results, which needs further investigation.

Although the findings of Study 1 suggested that traffic climate and driver behaviors are related, the findings of the Study 2 did not support those findings. The differences in demographic variables of the two samples (i.e. Turkish drivers in Study 1 and young Turkish drivers in Study 2) might be the underlying reason for the inconsistent results. To specify, in Study 1, the age range of the Turkish participants was 19-61 with a mean of 31.72, and their mean total mileage was 115792 km however in Study 2, the age range of the young Turkish participants was 19-25 with a mean of 22.28, and their mean total mileage was 33867 km. Based on these differences, it can be suggested that two samples differed on their level of experience. The attitudes of young drivers towards traffic environment might not have been developed due to their low experience in traffic. In order to understand the possible role of experience in traffic during attitude formation for traffic climate, traffic climate of young professional drivers with higher experience (e.g. higher total mileage) and young non-professional drivers might be compared in future research. Attitudes are helpful to organize new information. Traffic is a complex system causing to experience new situations frequently. Drivers might need more experience to form attitudes and organize new information based on these attitudes.

In Study 2, both implicit and explicit attitudes towards traffic climate were examined in a young driver sample. Additionally, both self-reported driver behaviors and outcomes of simulated driving were examined. Before starting the driving simulator part, the participants were asked to show a similar driving performance to their daily lives. Although they were asked to perform a similar driving to their daily lives, their perceptions about the traffic climate in the simulation scenario were not asked. In other words, the specificity level of the two variables might not be equal. Hence, in future studies, the TCS can be applied

specifically for the simulator scenario and the analyses can be conducted accordingly.

In the literature, implicit measure for traffic climate was developed for the first time and the findings provide a chance to compare explicit attitudes and implicit attitudes towards traffic climate. Among the results, it might be plausible to suggest that, young drivers were able to develop implicit attitudes towards functionality. Findings highlighted the importance of implicit attitudes towards functionality in traffic context. As young driver perceived traffic climate implicitly more functional, they reported higher positive driver behaviors, and showed less variance in lane keeping in simulated driving. The lower variance might reflect less lane changing, which might be safer for road traffic safety. Compared to external affective demands and internal requirements, functionality dimension is more concrete, which is about characteristics of safety and mobility requirements for a functional traffic system. Hence, in order to increase road safety in young drivers, interventions might focus on functionality.

Previously in the literature, the relationships between traffic climate and driver behaviors were reported for explicit attitudes. However, self-report instruments might include biases. In order to see whether the stated relationships were significant because of biased results, the same relationships were tested also for implicit attitudes towards traffic climate. The results of the current study suggested that implicit attitudes might also be related to driver behaviors.

Traffic is a complex system and mostly includes spontaneous decisions, and implicit attitudes are more important for spontaneous decision-making (Perugini, 2005; & Rydell & McConnell, 2006). To increase road safety, interventions that directly aim to change implicit attitudes might be more effective. However, implicit attitudes change slowly by using substantial amounts of counter attitudinal information compared to explicit attitudes (Rydell & McConnell, 2006). Since implicit attitude change requires long time, systematic interventions can be included in schedules of

driving schools. In addition, in order to change implicit attitudes towards traffic climate, priming techniques can be used.

Taken together, the characteristics of the samples might be closely related to both perceptions of traffic climate and driver behaviors. The results of Study 1 imply that the relationships between traffic climate and driver behaviors show both cross-cultural similarities and differences. The results of Study 2 suggest that, people can hold different implicit and explicit attitudes towards traffic climate, which was mainly about functionality of traffic climate. When the findings of Turkish drivers were compared as two groups, it can be assumed that level of experience might affect the perceptions of drivers and young drivers need more experience to develop attitudes towards traffic climate both explicitly and implicitly. Hence, interventions to increase road safety might focus on young driver groups with a long-term orientation perspective in traffic safety. Additionally, in order to investigate the stated assumption, drivers from different age groups and different driver groups (i.e. professionals and non-professionals) can be included in further studies.

4.2. Implications

In both study 1 and study 2, drivers' explicit attitudes towards traffic climate were measured. As Turkish drivers perceived traffic climate requiring higher internal requirements, they perceived traffic climate less functional. However, as Chinese drivers perceived traffic climate requiring higher skills, they perceived traffic climate more functional. Internal requirements are about the skills and abilities that are required in traffic environment. Functional traffic climate is about rules such as presence of preventive measures, enforcement, deterrring rules. Additionally, it is also about the mobility and safety of traffic environment, like being safe, functional, freeflowing and planned (Gehlert et al., 2014). In Turkey, drivers might be more likely to attribute positive traffic climate to their self-related skills and abilities, rather than functionality of the traffic system. However, Chinese drivers might think functionality and required skills are better when they operate together. In Study 2, the implicit attitudes towards implicit attitudes were measured for the Turkish

sample. The results showed that as Turkish drivers perceived traffic climate requiring higher skills, they perceived it as more functional. Taken together, it might be plausible to suggest that, Turkish drivers might have self-enhancement bias towards their driving abilities. In other words, Turkish drivers might perceive their driving skills higher than their actual driving skills, which is dangerous for road traffic safety. Priming techniques can be used systematically to change their implicit attitudes towards their own driving skills, by effectively using billboards or screens on roads.

Both the results of the current study and the previous literature supported the assumption that young drivers are able to show higher numbers of violations and speeding. Hence, use of "student driver" in traffic, which allows following drivers for two years after receiving the driving license might have a critical role in increasing road safety. However, a driver might not be active in traffic after receiving the driving license. This group of drivers will be recorded as successful drivers since they will not any tickets. A monitoring system is required to be sure whether a "student driver" completes the internship process as a really successful driver or just because not being an active driver. All in all, an effective internship process might be helpful to decrease violations and errors among young drivers.

REFERENCES

Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology, 52,* 27–58.

Bjørnskau, T., & Sagberg, F. (2005). What do novice drivers learn during the first months of driving? Improved handling skills or improved road user interaction? In G. Underwood (Ed.), *Traffic and Transportation Psychology: Theory and Application* (pp. 129-140) Oxford: Elsevier.

Bella, F. (2008). Driving simulator for speed research on two-lane rural roads. *Accident Analysis and Prevention, 40,* 1078–1087. doi: 10.1016/j.aap.2007.10.015

Bıçaksız, P., & Özkan, T. (2016). Developing the Impulsive Driver Behavior Scale. *Transportation Research Part F: Traffic Psychology and Behaviour, 43,* 339–356.

Brill, J. C., Mouloua, M., Shirkey, E., & Alberti, P. (2009, October). Predictive validity of the Aggressive Driver Behavior Questionnaire (ADBQ) in a simulated environment. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 53, No. 18, pp. 1334-1337). Sage CA: Los Angeles, CA: SAGE Publications.

Brinol, P., Petty, R. E. & McCaslin, M. J. (2009) Changing attitudes on implicit versus explicit measures. In R.E. Petty, R.H. Fazio & P. Brinol (eds.), *Attitudes: Insights from the new implicit measures*, pp. 285-326. Hove: Psychology Press.

Caird, J. K., & Kline, T. J. (2004). The relationships between organizational and individual variables to on-the-job driver accidents and accident-free kilometres. *Ergonomics*, *47*(15), 1598–1613.

Carr, J. Z., Schmidt, A. M., Ford, J. F., & DeShon, R. P. (2003). Climate perceptions matter: A meta-analytic path analysis relating molar climate, cognitive and

affective states, and individual level work outcomes. *Journal of Applied Psychology, 88,* 605–619.

Carsten, O., & Jamson, A. H. (2011). Driving simulators as research tools in traffic psychology. In *Handbook of Traffic Psychology* (pp. 87-96).

Cheyne, A., Cox, S., Oliver, A., & Tomás, J. M. (1998). Modelling safety climate in the prediction of levels of safety activity. *Work & Stress, 12,* 255–271.

Cohen, J. B., and Reed, A. (2006). A Multiple Pathway Anchoring and Adjustment (MPAA) model of attitude generation and recruitment. *Journal of Consumer Research, 33,* 1–15.

Chu, W., Wu, C., Atombo, C., Zhang, H., & Özkan, T. (Under review). Traffic Climate, Driver Behavior, and Accidents Involvement in China.

Davey, J., Wishart, D., Freeman, J., & Watson, B. (2007). An application of the driver behaviour questionnaire in an Australian organisational fleet setting. *Transportation Research Part F, 10,* 11−21.

Davies, J., Lee, H., & Falkmer, T. (2011). An investigation into the impact of Parkinson's disease upon decision making ability and driving performance. In *Diagnostics and Rehabilitation of Parkinson's Disease*. InTech.

de Winter, J. C. F., de Groot, S., Mulder, M., Wieringa, P. A., Dankelman, J., & Mulder, J. A. (2009). Relationships between driving simulator performance and driving test results. *Ergonomics*, *52*(2), 137–153.

de Winter, J. C. F., & Dodou, D. (2010). The Driver Behaviour Questionnaire as a predictor of accidents: A meta-analysis. *Journal of Safety Research, 41*(6), 463-470.

Deng, Z., Chu, D., Wu, C., He, Y., & Cui, J. (2018). Curve safe speed model considering driving style based on driver behaviour questionnaire. *Transportation Research Part F: Traffic Psychology and Behaviour*.

Devos, T. (2008) Implicit attitudes 101: Theoretical and empirical insights. In W.D. Crano & R. Prislin (eds.), *Attitudes and Attitude Change,* 61–86. Hove: Psychology Press.

Elander, J., West, R., & French, D. (1993). Behavioral correlates of individual differences in road traffic crash risk: an examination of methods and findings. *Psychological Bulletin, 113,* 279–294.

Erkuş, U. U. (2017). Risk perception and driving performance comparisons between young male non-professional drivers and taxi drivers. (Unpubslihed master thesis, Middle East Technical University).

Ernst, M., & Paulus, M. P. (2005). Neurobiology of decision-making: a selective review from a neurocognitive and clinical perspective. *Biological Psychiatry, 58,* 597–604. doi:10.1016/j.biopsych.2005.06.004

Evans, L. (1991). *Traffic safety and the driver.* New York: Van Nostrand Reinhold.

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology*, *54*(1), 297–327.

Gawronski, B. & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin, 132,* 692–731.

Gawronski, B., LeBel, E. P., & Peters, K. R. (2007). What do implicit measures tell us?: Scrutinizing the validity of three common assumptions. *Perspectives on Psychological Science*, *2*(2), 181–193.

Gaygısız, E. (2010). Cultural values and governance quality as correlates of road traffic fatalities: A nation level analysis. *Accident Analysis and Prevention*, *42*, 1894–1901.

Gehlert, T., Hagemeister, C., & Özkan, T. (2014). Traffic safety climate attitudes of road users in Germany. *Transportation Research Part F: Traffic Psychology and Behaviour*, *26*, 326–336.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: attitudes, self-esteem, and stereotypes. *Psychological Review*, *102*(1), 4–27.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*(6), 1464–1480.

Gregg, A. P., Siebt, B., & Banaji, M. R. (2006) Easier said than undone: Asymmetries in the malleability of implicit preferences. *Journal of Personality and Social Psychology*, *90*(1), 1–20.

Groeger, J. A. (2000). *Understanding driving: applying cognitive psychology to a complex everyday task.* East Sussex: Psychology Press Ltd.

Gueho, L., Granie, M. A., & Abric, J. C. (2014). French validation of a new version of the Driver Behavior Questionnaire (DBQ) for drivers of all ages and level of experiences. *Accident Analysis and Prevention*, *63*, 41–48.

Guldenmund, F. (2000). The nature of safety culture: A review of theory and research. *Safety Science, 34*(1-3), 215–257.

Hassan, H. M., & Abdel-Aty, M. A. (2013). Exploring the safety implications of young drivers' behavior, attitudes and perception. *Accident Analysis and Prevention, 50,* 361–370. doi: 10.1016/j.aap.2012.05.003

Helman, S., & Reed, N. (2015). Validation of the driver behaviour questionnaire using behavioural data from an instrumented vehicle and high-fidelity driving simulator. *Accident Analysis and Prevention, 75,* 245–251. doi: 10.1016/j.aap.2014.12.008

Hofstede, G. (2001). *Culture's consequences: Comparing values* (2nd ed.). California: Sage Publication Inc.

Hofmann, W., Gawronski, B., Gschwender, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the implicit association test and explicit self-report measures. *Personality and Social Psychology Bulletin 31*(10), 1369–1385.

Karpinski, A., & Steinman, R. B. (2006). The single category implicit association test as a measure of implicit social cognition. *Journal of Personality and Social Psychology*, *91*(1), 16–32.

Katz, D. (1960). The functional approach to the study of attitudes. *Public Opinion Quarterly, 24*(2), 163–204.

Kaufmann, D. N., Kraay, A., & Mastruzzi, M. (2007). *Governance matters VI: Aggregate and individual governance indicators, 1996–2006. Policy research working paper series (report no: 4280).* Washington, DC: The World Bank.

Korner-Bitensky, N, Sofer, S, Kaizer, F, Gelinas, I and Talbot, L. 1994. Assessing Ability to Drive Following an Acute Neurological Event: Are We on the Right Road?. *Canadian Journal of Occupational Therapy, 61*(3), 141–148.

Kraus, S. J. (1995). Attitudes and the prediction of behavior: A meta-analysis of the empirical literature. *Personality and Social Psychology Bulletin, 21*(1), 58–75.

Lajunen, T., & Özkan, T. (2011). Self-report instruments and methods. *Handbook of Traffic Psychology*.

Lajunen, T., Parker, D., & Summala, H. (2004). The Manchester driver behaviour questionnaire: a cross-cultural study. *Accident Analysis & Prevention, 36*(2), 231–238.

Lajunen, T., & Summala, H. (2003). Can we trust self-reports of driving? Effects of impression management on driver behaviour questionnaire responses. *Transportation Research Part F: Traffic Psychology and Behaviour, 6*(2), 97–107.

Laapotti, S., & Keskinen, E. (2004). Has the difference in accident patterns between male and female drivers changed between 1984 and 2000? *Accident Analysis and Prevention, 36,* 577–584. doi: 10.1016/S0001-4575(03)00064-2

Laapotti, S., Keskinen, E., Hatakka, M., & Katila, A. (2001). Novice drivers' accident and violations – a failure on higher or lower hierarchical levels of driving behaviour. *Accident Analysis and Prevention, 33,* 759–769.

Larue, G. S., Rakotonirainy, A., & Pettitt, A. N. (2011). Real-time evaluation of driver's alertness on highways. *WIT Transactions on The Built Environment*, *116*, 553–564.

Lawton, R., Parker, D., Manstead, A. S. R., & Stradling, S. (1997). The role of affect in predicting social behaviours: The case of road traffic violations. *Journal of Applied Social Psychology, 27,* 1258–1276.

Ledesma, R. D., Tosi, J., Poó, F. M., Montes, S. A., & López, S. S. (2015). Implicit attitudes and road safety behaviors. The helmet-use case. *Accident Analysis and Prevention*, *79*, 190–197.

Leviäkangas, P. (1998). Accident risk of foreign drivers - the case of Russian drivers in South-Eastern Finland. *Accident Analysis and Prevention, 30,* 245–254.

Lewin, I. (1982). Driver training: A perceptual-motor skill approach. *Ergonomics, 25,* 917–924.

Madigan, R., Louw, T., & Merat, N. (2018). The effect of varying levels of vehicle automation on drivers' lane changing behaviour. PloS one, 13(2), e0192190.

Martinussen, L. M., Møller, M., & Prato, C. G. (2014). Assessing the relationship between the Driver Behavior Questionnaire and the Driver Skill Inventory: Revealing sub-groups of drivers. *Transportation Research Part F: Traffic Psychology and Behaviour*, *26*, 82–91.

Martinussen, L. M., Sømhovd, M. J., Møller, M., & Siebler, F. (2015). A Go/No-go approach to uncovering implicit attitudes towards safe and risky driving. *Transportation Research Part F: Traffic Psychology and Behaviour, 30,* 74–83. doi: 10.1016/j.trf.2015.02.005

McKenzie, R.M. and Gilmore, A. (2017) "The people who are out of 'right' English": Japanese university students' social evaluations of English language diversity and the internationalisation of Japanese higher education. *International Journal of Applied Linguistics, 27*(1), 152–175.

Mearns, K., Flin, R., Gordon, R., & Fleming, M. (1998). Measuring safety climate on offshore installations. *Work & Stress, 12,* 238–254.

Mecheri, S., Rosey, F., & Lobjois, R. (2017). The effects of lane width, shoulder width, and road cross-sectional reallocation on drivers' behavioral adaptations. *Accident Analysis and Prevention*, *104*, 65–73.

Meuleners, L., & Fraser, M. (2015). A validation study of driving errors using a driving simulator. *Transportation Research Part F: Traffic Psychology and Behaviour*, *29*, 14–21.

Näätänen, R., & Summala, H. (1976). *Road user behavior and traffic accidents*. Amsterdam and New York: North-Holland / American Elsevier.

Oron-Gilad, T., & Ronen, A. (2007). Road characteristics and driver fatigue: a simulator study. *Traffic Injury Prevention*, *8*(3), 281–289.

Ostrom, L., Wilhelmsen, C., & Kaplan, B. (1993). Assessing safety culture. *Nuclear Safety, 34,* 163–172.

Öz, B., Özkan, T., & Lajunen, T. (2010). Professional and non-professional drivers' stress reactions and risky driving. *Transportation Research Part F: Traffic Psychology and Behaviour*, *13*(1), 32–40.

Öz, B., Özkan, T., & Lajunen, T. (2013). An investigation of professional drivers: Organizational safety climate, driver behaviours and performance. *Transportation Research Part F: Traffic Psychology and Behaviour*, *16*, 81–91.

Özkan, T., Doğruyol, B., Harma, M., Bıçaksız, P., & Lajunen, T. (2013). *Algı-motor ve g.v enli sürücülük becerilerinin örtük ölçülmesi ve objektif performans testleri ile ilişkisi.* TÜBİTAK Project Report. No: 111K333.

Özkan, T., & Lajunen, T. Traffic culture and traffic climate scale. Unpublished manuscript.

Özkan, T., & Lajunen, T. (2005). A new addition to DBQ: Positive driver behaviours scale. *Transportation Research Part F: Traffic Psychology and Behaviour*, *8*(4), 355–368.

Özkan, T., & Lajunen, T. (2007). The role of personality, culture, and economy in unintentional fatalities: An aggregated level analysis. *Personality and Individual Differences*, *43*, 519–530.

Özkan, T., & Lajunen, T. (2011). Person and environment: Traffic culture. *Handbook of Traffic Psychology*, 179–192.

Özkan, T., & Lajunen, T. (2015). A General Traffic (Safety) Culture System (G-TraSaCu-S).

Özkan, T., Lajunen, T., Chliaoutakis, J., Parker, D., & Summala, H. (2006). Cross-cultural differences in driving behaviours: A comparison of six countries. *Transportation Research Part F: Traffic Psychology and Behaviour, 9,* 227–242.

Özkan, T., Lajunen, T., Chliaoutakis, J. E., Parker, D., & Summala, H. (2006). Cross-cultural differences in driving skills: A comparison of six countries. *Accident Analysis & Prevention*, *38*(5), 1011–1018.

Öztürk, İ. (2017). *Young driver behaviors in relations to the implicit and explicit driving skills* (Unpublished master thesis, Middle East Technical University). doi: 10.13140/RG.2.2.18692.63362

Palat, B., & Delhomme, P. (2016). A simulator study of factors influencing drivers' behavior at traffic lights. *Transportation Research Part F: Traffic Psychology and Behaviour*, *37*, 107–118.

Parker, D., Reason, J. T., Manstead, A. S. R., & Stradling, S. G. (1995). Driving errors, driving violations and accident involvement. *Ergonomics, 38,* 1036–1048.

Petty, R.E., Tormala, Z. L., Brinol, P., & Jarvis, W.B.G. (2006) Implicit ambivalence from attitude change: An exploration of the PAST model. *Journal of Personality and Social Psychology, 90*(1), 21–41.

Postelnicu, C. C., Machidon, O. M., Girbacia, F., Voinea, G. D., & Duguleana, M. (2016). Effects of playing mobile games while driving. In *International Conference on Distributed, Ambient, and Pervasive Interactions* (pp. 291-301). Springer, Cham.

Reason, J., Manstead, A., Stradling, S., Baxter, J., & Campbell, K. (1990). Errors and violations on the roads: a real distinction?. *Ergonomics*, *33*(10-11), 1315–1332.

Rowe, R., Roman, G. D., McKenna, F. P., Barker, E., & Poulter, D. (2015). Measuring errors and violations on the road: A bifactor modeling approach to the Driver Behavior Questionnaire. *Accident Analysis and Prevention, 74,* 118–125. doi: 10.1016/j.aap.2014.10.012

Rudman, L. A. (2011). Implicit measures for social and personality psychology. Thousand Oaks, CA: Sage.

Rusu, A., Sârbescu, P., Moza, D., & Stancu, A. (2017). Implicit attitudes towards risky driving: Development and validation of an affect misattribution procedure for speeding. *Accident Analysis and Prevention*, *100*, 15–22.

Rydell, R.J. & A.R. McConnell (2006). Understanding implicit and explicit attitude change: A systems reasoning analysis. *Journal of Personality and Social Psychology, 91*(6), 995–1008.

Schwartz, S. H. (2006). A theory of cultural value orientations: Explication and applications. *Comparative Sociology, 5*, 137–182.

Shechtman, O., Classen, S., Awadzi, K., & Mann, W. (2009). Comparison of driving errors between on-the-road and simulated driving assessment: a validation study. *Traffic injury prevention*, *10*(4), 379–385.

Shen, B., Qu, W., Ge, Y., Sun, X., & Zhang, K. (2018). The relationship between personalities and self-report positive driving behavior in a Chinese sample. *PLoS one*, *13*(1), e0190746.

Solmazer, G., Üzümcüoğlu, Y., & Özkan, T. (2016). The role of traffic law enforcements in the relationship between cultural variables and traffic fatality rates across some countries of the world. *Transportation Research Part F: Traffic Psychology and Behaviour*, *38*, 137–150.

Stradling, S. G., & Parker, D. (1996). *Violations on the road: Bad attitudes make bad drivers.* Birmingham, UK: Paper presented at the International Conference on Road Safety in Europe.

Sullman, M. J. M., Meadows, M. L., & Pajo, K. B. (2002). Aberrant driving behaviours amongst New Zealand truck drivers. *Transportation Research Part F: Traffic Psychology and Behaviour, 5,* 217−232.

Sümer, N., Lajunen, T., & Özkan, T. (2002). Sürücü Davranışlarının Kaza Riskindeki Rolü: İhlaller ve Hatalar. *Ankara: Uluslararası Trafik ve Yol Güvenliği Kongresi. Gazi Üniversitesi*.

Sümer, N., Özkan, T., & Lajunen, T. (2006). Asymmetric relationship between driving and safety skills. *Accident Analysis and Prevention, 38,* 703–711. doi: 10.1016/j.aap.2005.12.016

Taubman-Ben-Ari, O., Eherenfreund-Hager, A., & Prato, C. G. (2016). The value of self-report measures as indicators of driving behaviors among young drivers. *Transportation Research Part F: Traffic Psychology and Behaviour, 39,* 33–42. doi: 10.1016/j.trf.2016.03.005

Üzümcüoğlu, Y., Özkan, T., & Lajunen, T. (under review). The relationships between cultural variables, law enforcements and driver behaviours across 37 nations.

Ward, N. J., Linkenbach, J., Keller, S. N., & Otto, J. (2010). White paper on traffic safety culture. *White Paper*(2).

Warner, H. W., Özkan, T., Lajunen, T., & Tzamalouka, G. (2011). Cross-cultural comparison of drivers' tendency to commit different aberrant driving behaviours. *Transportation Research Part F: Traffic Psychology and Behaviour*, *14*(5), 390–399.

Warner, H. W., Özkan, T., Lajunen, T., & Tzamaloukas, G. (2013). Cross-cultural comparison of driving skills among students in four different countries. *Safety Science, 57,* 69–74. doi: 10.1016/j.ssci.2013.01.003

Wiegmann, D. A., von Thaden, T. L., & Gibbons, A. M. (2007). A review of safety culture theory and its potential application to traffic safety. *Improving Traffic Safety Culture in the United States, 113.*

Wilson, T. D., Lindsey, S., & Schooler, T. Y. (2000) A model of dual attitudes. *Psychological Review, 107*(1), 101–126.

World Health Organization. (2009). *Global status report on road safety: time for action*. World Health Organization.

World Health Organization (2015). Global Status Report on Road Safety. Retrieved from: http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/

World Health Organization. (2016). World Health Statistics 2016. World Health Organization. Retrieved from: http://gamapserver.who.int/mapLibrary/Files/Maps/Global_RoadTraffic_Mortality_2013.png

Xie, C., Parker, D., & Stradling, S. (2004). Driver behaviour and its consequence: The case of Chinese drivers. *Traffic and transport psychology. Theory and application* (pp. 193−199). Oxford: Elsevier.

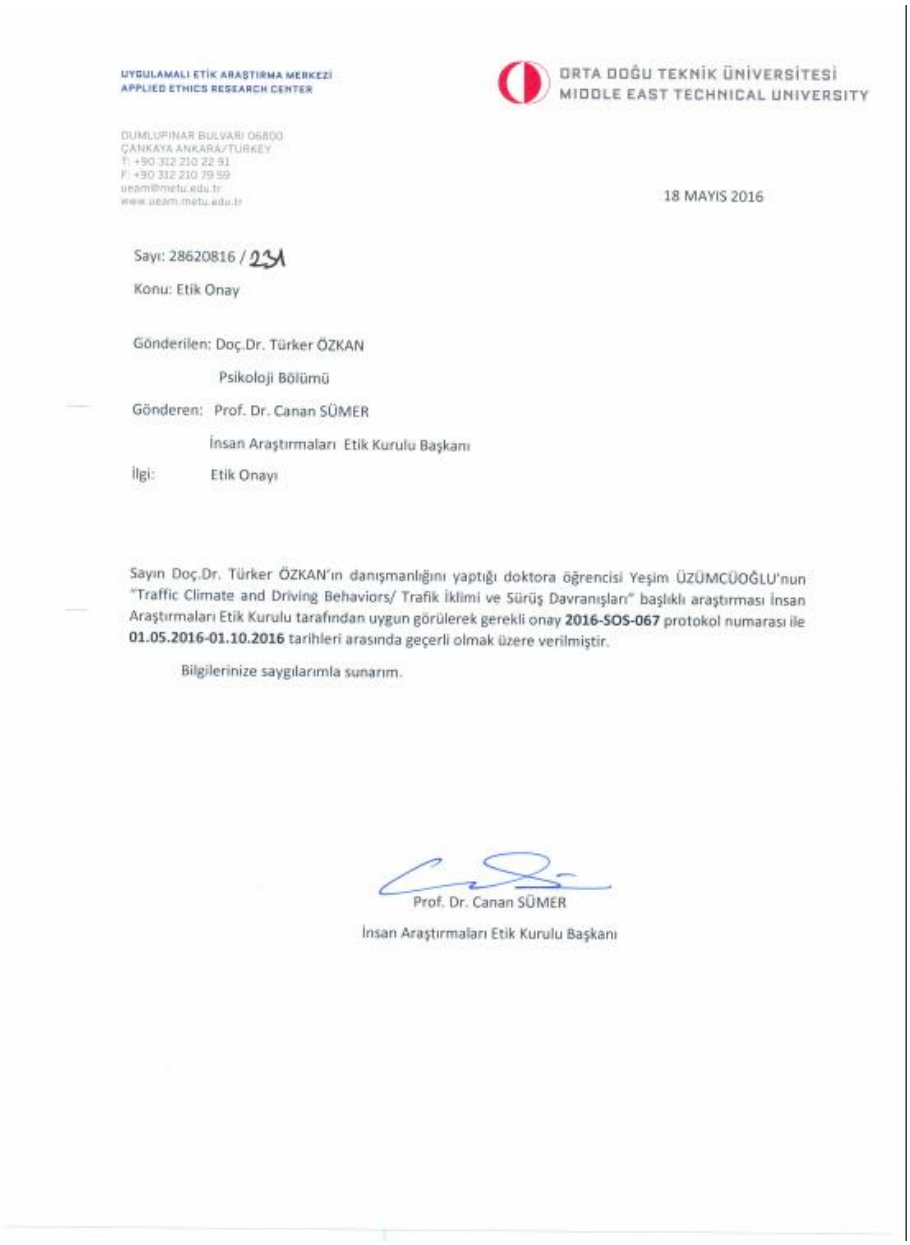
Zhang, Q., Ge, Y., Qu, W., Zhang, K., & Sun, X. (2018). The traffic climate in China: The mediating effect of traffic safety climate between personality and dangerous driving behavior. *Accident Analysis & Prevention*, *113*, 213–223.

Zhang, Q., Jiang, Z., Zheng, D., Wang, Y., & Man, D. (2013). An application of the Driver Behavior Questionnaire to Chinese carless young drivers. *Traffic Injury Prevention, 14*(8), 867–873. doi: 10.1080/15389588.2013.775432

Zohar, D. (1980). Safety climate in industrial organizations: theoretical and applied implications. *Journal of Applied Psychology, 65*(1), 96–102.

APPENDICES

A: Ethical Permission



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Gönderilen: Doç.Dr. Türker ÖZKAN
Psikoloji Bölümü

Gönderen: Prof. Dr. Canan SÜMER
İnsan Araştırmaları Etik Kurulu Başkanı

İlgi: Etik Onayı

Sayın Doç.Dr. Türker ÖZKAN'ın danışmanlığını yaptığı doktora öğrencisi Yeşim ÜZÜMCÜOĞLU'nun "Traffic Climate and Driving Behaviors/ Trafik İklimi ve Sürüş Davranışları" başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay **2016-SOS-067** protokol numarası ile **01.05.2016-01.10.2016** tarihleri arasında geçerli olmak üzere verilmiştir.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Canan SÜMER
İnsan Araştırmaları Etik Kurulu Başkanı

B: Informed Consent Form

ARAŞTIRMAYA GÖNÜLLÜ KATILIM FORMU

Bu araştırma, ODTÜ Psikoloji Bölümü öğretim elemanlarından Doç. Dr. Türker Özkan danışmanlığında Arş. Gör. Yeşim Üzümcüoğlu tarafından tez araştırması kapsamında yürütülmektedir. Bu form sizi araştırma koşulları hakkında bilgilendirmek için hazırlanmıştır.

Çalışmanın Amacı Nedir?

Çalışmanın amacı, trafik ikliminin örtük ve beyana dayalı şekillerde ölçülerek, trafik iklimi ve sürücü davranışları arasındaki ilişkinin incelenmesidir.

Bize Nasıl Yardımcı Olmanızı İsteyeceğiz?

Çalışma kapsamında sizden yaklaşık 1 saat süren bir deney bataryası tamamlamanız istenecektir.

Sizden Topladığımız Bilgileri Nasıl Kullanacağız?

Araştırmaya katılımınız tamamen gönüllülük temelinde olmalıdır. Çalışmada, kimlik belirleyici hiçbir bilgi istenmemektedir. Anket formları gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir. Elde edilecek bilgiler sadece bilimsel yayımlarda kullanılacaktır.

Katılımınızla ilgili bilmeniz gerekenler:

Çalışma genel olarak kişisel rahatsızlık verecek bir etkileşim içermemektedir. Ancak, katılım sırasında herhangi bir nedenden ötürü kendinizi rahatsız hissederseniz çalışmayı istediğiniz zaman bırakmakta serbestsiniz.

Araştırmayla ilgili daha fazla bilgi almak isterseniz:

Bu çalışmaya katıldığınız için şimdiden çok teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için araştırmacılar ile iletişim kurabilirsiniz.

Yeşim Üzümcüoğlu (yuzumcu@metu.edu.tr) Tel.: 312 210 51 10

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

Ad Soyad Tarih İmza

---/----/-----

C: Demographic Information Form

Demografik sorular

A1.
Yaşınız: _____

A2.
Cinsiyetiniz: ☐ Erkek ☐ Kadın

A3. Aşağıdakilerden hangisi sosyo- ekonomik statünüzü tanımlar? ☐ Alt ☐ Ortanın altı ☐ Orta ☐ Ortanın Üstü ☐ Üst

A4. Eğitim durumunuz?
☐ Okur-yazar ☐ İlkokul ☐ Ortaokul ☐ Lise
☐ Üniversite (Lisans) ☐ Üniversite (Lisansüstü)

A5. Ehliyetiniz var mı? ☐ Hayır ☐ Evet

A6. Kaç yıldır ehliyet sahibisiniz? _____

A7. Son bir yılda yaklaşık olarak toplam kaç kilometre araç kullandınız?
_____km

A8. Bütün hayatınız boyunca yaklaşık olarak toplam kaç kilometre araç kullandınız?
_____km

A9. Genel olarak, ne sıklıkla araç kullanırsınız?
☐ Hemen hemen her gün ☐ Haftada 3-4 gün ☐ Haftada 1-2 gün
☐ Ayda birkaç kez ☐ Çok nadir

A10. Son üç yılda kaç kez araç kullanırken **aktif olarak** (sizin bir araca, bir yayaya veya herhangi bir nesneye çarptığınız durumlar) kaza yaptınız? (hafif kazalar dâhil)_____ kez

A11. Son üç yılda kaç kez araç kullanırken **pasif olarak** (bir aracın ya da bir yayanın size çarptığı durumlar) kaza geçirdiniz? (hafif kazalar dâhil)_____kez

A12. Son üç yılda aşağıdaki trafik cezalarını kaç kere aldığınızı belirtiniz.
Yanlış park etme :_____
Hatalı sollama :_____
Hız ihlali :_____
Diğer :_____

D: Driver Behaviors Questionnaire

Aşağıda verilen durumları ne sıklıkta yaparsınız?
Lütfen her bir madde için verilen durumun ne sıklıkta başınızdan geçtiğini belirtiniz. Soruları, nasıl araç kullandığınızı düşünerek cevaplandırınız ve her bir soru için sizi tam olarak yansıtan cevabı, yanındaki kutudaki uygun rakamı daire içine alarak belirtiniz.

0= HİÇ BİR ZAMAN 1= NADİREN 2= BAZEN 3= OLDUKÇA SIK 4= SIK SIK 5= HER ZAMAN

		Hiçbir zaman	Nadiren	Bazen	Oldukça sık	Sık sık	Her zaman
1	Geri geri giderken önceden fark etmediğiniz birşeye çarpmak	0	1	2	3	4	5
2	Trafikte, diğer sürücülere engel teşkil etmemeye gayret göstermek	0	1	2	3	4	5
3	A yönüne gitmek amacıyla yola çıkmışken kendinizi daha alışkın olduğunuz B yönüne doğru araç kullanırken bulmak	0	1	2	3	4	5
4	Geçiş hakkı sizde dahi olsa diğer sürücülere yol vermek	0	1	2	3	4	5
5	Yasal alkol sınırlarının üzerinde alkollü olduğunuzdan şüphelenseniz de araç kullanmak	0	1	2	3	4	5
6	Aracınızı kullanırken yol kenarında birikmiş suyu ve benzeri maddeleri yayaların üzerine sıçratmamaya dikkat etmek	0	1	2	3	4	5
7	Dönel kavşakta dönüş istikametinize uygun olmayan şeridi kullanmak	0	1	2	3	4	5
8	Anayoldan sola dönmek için kuyrukta beklerken, anayol trafiğine dikkat etmekten neredeyse öndeki araca çarpacak duruma gelmek	0	1	2	3	4	5
9	Trafikte, herhangi bir sürücü size yol verdiğinde veya anlayış gösterdiğinde, elinizi sallayarak, korna çalarak vb. şekilde teşekkür etmek	0	1	2	3	4	5

		Hiçbir zaman	Nadiren	Bazen	Oldukça sık	Sık sık	Her zaman
10	Anayoldan bir sokağa dönerken karşıdan karşıya geçen yayaları fark edememek	0	1	2	3	4	5
11	Başka bir sürücüye kızgınlığı belirtmek için korna çalmak	0	1	2	3	4	5
12	Karşıdan gelen araç sürücüsünün görüş mesafesini koruyabilmesi için uzunları mümkün olduğunca az kullanmak	0	1	2	3	4	5
13	Bir aracı sollarken ya da şerit değiştirirken dikiz aynasından yolu kontrol etmemek	0	1	2	3	4	5
14	Kaygan bir yolda ani fren veya patinaj yapmak	0	1	2	3	4	5
15	Arkanızdan hızla gelen aracın yolunu kesmemek için sollamadan vazgeçip eski yerinize dönmek	0	1	2	3	4	5
16	Kavşağa çok hızlı girip geçiş üstünlüğü olan aracı durmak zorunda bırakmak	0	1	2	3	4	5
17	Şehir içi yollarda hız sınırını aşmak	0	1	2	3	4	5
18	Önünüzdeki aracın sürücüsünü, onu rahatsız etmeyecek bir mesafede takip etmek	0	1	2	3	4	5
19	Sinyali kullanmayı niyet ederken silecekleri çalıştırmak	0	1	2	3	4	5
20	Sağa dönerken yanınızdan geçen bir bisiklet ya da araca neredeyse çarpmak	0	1	2	3	4	5
21	"Yol ver" işaretini kaçırıp, geçiş hakkı olan araçlarla çarpışacak duruma gelmek	0	1	2	3	4	5
22	Yeşil ışık yandığı halde hareket etmekte geciken öndeki araç sürücüsünü korna çalarak rahatsız etmemek	0	1	2	3	4	5
23	Trafik ışıklarında üçüncü vitesle kalkış yapmaya çalışmak	0	1	2	3	4	5
24	Yayaların karşıdan karşıya geçebilmeleri için geçiş hakkı sizde dahi olsa durarak yol vermek	0	1	2	3	4	5
25	Sola dönüş sinyali veren bir aracın sinyalini fark etmeyip onu sollamaya çalışmak	0	1	2	3	4	5

		Hiçbir zaman	Nadiren	Bazen	Oldukça sık	Sık sık	Her zaman
26	Trafikte sinirlendiğiniz bir sürücüyü takip edip ona haddini bildirmeye çalışmak	0	1	2	3	4	5
27	Arkanızdaki aracın ileriyi iyi göremediği durumlarda sinyal vb. ile işaret vererek sollamanın uygun olduğunu belirtmek	0	1	2	3	4	5
28	Otoyolda ileride kapanacak bir şeritte son ana kadar ilerlemek	0	1	2	3	4	5
29	Sollama yapan sürücüye kolaylık olması için hızınızı onun geçiş hızına göre ayarlamak	0	1	2	3	4	5
30	Aracınızı park alanında nereye bıraktığınızı unutmak	0	1	2	3	4	5
31	Solda yavaş giden bir aracın sağından geçmek	0	1	2	3	4	5
32	Trafik ışığında en hızlı hareket eden araç olmak için yandaki araçlarla yarışmak	0	1	2	3	4	5
33	Trafik işaretlerini yanlış anlamak ve kavşakta yanlış yöne dönmek	0	1	2	3	4	5
34	Acil bir durumda duramayacak kadar, öndeki aracı yakın takip etmek	0	1	2	3	4	5
35	Trafik ışıkları sizin yönünüze kırmızıya döndüğü halde kavşaktan geçmek	0	1	2	3	4	5
36	Otobanda trafik akışını sağlayabilmek için en sol şeridi gereksiz yere kullanmaktan kaçınmak	0	1	2	3	4	5
37	Bazı tip sürücülere kızgın olmak (illet olmak) ve bu kızgınlığı bir şekilde onlara göstermek	0	1	2	3	4	5
38	Seyahat etmekte olduğunuz yolu tam olarak hatırlamadığınızı fark etmek	0	1	2	3	4	5
39	Sollama yaparken karşıdan gelen aracın hızını olduğundan daha yavaş tahmin etmek	0	1	2	3	4	5
40	Gereksiz yere gürültü yapmamak için kornayı kullanmaktan kaçınmak	0	1	2	3	4	5
41	Otobanda hız limitlerini dikkate almamak	0	1	2	3	4	5
42	Aracınızı park ederken diğer yol kullanıcılarının (yayalar, sürücüler vb.) hareketlerini sınırlamamaya özen göstermek	0	1	2	3	4	5

E: Traffic Climate Scale

Ülkemizde trafik nasıldır?
Aşağıda, ülkemizdeki trafik sistemini, ortamını ve atmosferini tanımlamak için bazı kelimeler verilmiştir. Bu kelimelerin, ülkemizdeki trafik durumunu yansıtıp yansıtmadığı hakkındaki düşüncenizi size göre doğru olan seçeneği karalayarak belirtiniz. Her bir soru için cevap seçenekleri:
1 = Hiç tanımlamıyor, 2 = Tanımlamıyor, 3= Pek az tanımlıyor, 4= Biraz tanımlıyor, 5= Tanımlıyor, 6= Çok tanımlıyor

	1	2	3	4	5	6		1	2	3	4	5	6
1.Tehlikeli	O	O	O	O	O	O	23.Karşılıklı anlayışa dayalı	O	O	O	O	O	O
2.Dinamik	O	O	O	O	O	O	24.Planlı	O	O	O	O	O	O
3.Karmaşık	O	O	O	O	O	O	25.Üzerinizde baskı yapıcı	O	O	O	O	O	O
4.Saldırgan	O	O	O	O	O	O	26.Olanları telafi etmeye yönelik	O	O	O	O	O	O
5.Heyecan verici	O	O	O	O	O	O	27.Caydırıcı kurallar içeren	O	O	O	O	O	O
6.Hızlı	O	O	O	O	O	O	28. Riskli	O	O	O	O	O	O
7.Stresli	O	O	O	O	O	O	29. Kaotik	O	O	O	O	O	O
8.Monoton	O	O	O	O	O	O	30.Sabır gerektiren	O	O	O	O	O	O
9. Şansa bağlı	O	O	O	O	O	O	31.Tedirgin edici	O	O	O	O	O	O
10. Tetikte olmanızı gerektiren	O	O	O	O	O	O	32.Uyanık olmayı gerektiren	O	O	O	O	O	O
11. Kadere bağlı	O	O	O	O	O	O	33.Beceri gerektiren	O	O	O	O	O	O
12. Tedbirli olunmasını gerektiren	O	O	O	O	O	O	34.Ahenkli	O	O	O	O	O	O
13. Deneyim gerektiren	O	O	O	O	O	O	35.Zaman kaybettiren	O	O	O	O	O	O
14. Çabukluk gerektiren	O	O	O	O	O	O	36.Sinir bozucu	O	O	O	O	O	O
15. Trafik kurallarına uymanızı isteyen	O	O	O	O	O	O	37.Eşitlikçi	O	O	O	O	O	O
16. Yaptığınızın yanınıza kâr kaldığı	O	O	O	O	O	O	38.Güvenli	O	O	O	O	O	O
17. Değersiz olduğunuz hissini veren	O	O	O	O	O	O	39.İşlevsel	O	O	O	O	O	O
18. Hareketli	O	O	O	O	O	O	40. Akışkan	O	O	O	O	O	O
19.Gerginliklere neden olan	O	O	O	O	O	O	41.Trafik kuralları bilgisi gerektiren	O	O	O	O	O	O
20.Önleyici tedbirler içeren	O	O	O	O	O	O	42.Davranışlarınızı yönlendiren	O	O	O	O	O	O
21.Denetim altında	O	O	O	O	O	O	43.Ne olacağı belli olmayan	O	O	O	O	O	O
22.Bir yerden bir yere kolayca seyahat edilen	O	O	O	O	O	O	44.Yoğun	O	O	O	O	O	O

F: SC-IAT Traffic Climate

Not Externally Demanding	*Externally Demanding*	*Internally Demanding*	*Not Internally Demanding*
Yatıştıran	Sinirlendiren	Tetikte	Dikkatsiz
Huzurlu	Tedirgin	Uyanık	Gafil
Rahatlatan	Baskıcı	Tedbirli	Tedbirsiz
Düzenli	Düzensiz	Risksiz	Riskli
Heyecanlı	Sıradan	Bilgili	Bilgisiz
Kolaylaştıran	Oyalayıcı	Seri	Aheste
Canlı	Tekdüze	Deneyimli	Deneyimsiz
Gerçekçi	Kaderci	Becerikli	Beceriksiz
Değerli	Değersiz	Sabırlı	Sabırsız
Şanslı	Şanssız	İtaatli	İtaatsiz
Sakin	Gergin	Sistemli	Sistemsiz
Belirli	Belirsiz	Caydırıcı	Hükümsüz
Hızlı	Yavaş	Ulaşılabilir	Ulaşılamaz
Bedelsiz	Bedelli	Nezaketli	Nezaketsiz
Tenha	Yoğun		
Stressiz	Stresli		Trafik
Uzlaşıcı	Saldırgan		Kavşak
Tehlikesiz	Tehlikeli		Kural
			Sürücü
Functional	*Not Functional*		Yaya
Eşitlikçi	Kayırıcı		Fren
Güvenli	Güvensiz		Far
Akışkan	Tıkanık		
Planlı	Plansız		
Önleyici	Tepkisel		
İşlevsel	İşlevsiz		
Ahenkli	Uyumsuz		
Toleranslı	Toleranssız		
Denetimli	Denetimsiz		
Hareketli	Durağan		

F: Simulation Scenario

```
Metric
  7000, SIGN, 100, 1000, C:\STISIM\Data\EuroSigns\EuroSpeed_050.Lmm, 1, 0, 0
  7100, LS, 55, 1000
8000, ROAD, 3.66, 2, 1, 1, 0.3, 3.05, 3.05, 0.15, 0.15, 100, -1, -1, -5, 1.83, -5, 1.83,
-30, 3.05, -30, 3.05, 0, 0, 0, C:\STISIM\Data\Textures\Grass01.Jpg, 12, 0, 0,
C:\STISIM\Data\Textures\Grass04.Jpg, 12
8000, V, 12, 200, 2.13, 1, *1~13
8300, V, 17, 350, 2.13, 1, *1~13
8800, V, 15, 300, 2.13, 1, *1~13
8800, V, 15, 420, 2.13, 1, *1~13
7000, A, 12, 2000, -2.13, 3
7000, A, 12, 2050, -2.13, *1~13
7000, A, 12, 2100, -2.13, 3
7000, A, 12, 2150, -2.13, *1~13
7000, A, 12, 2175, -2.13, 3
7000, A, 12, 2200, -2.13, *1~13
7500, A, 12, 770, -2, 3
7500, A, 12, 850, -2, *1~13
7500, A, 12, 930, -2, *1~13
8000, A, 12, 880, -2, *29~34
8000, A, 12, 930, -2, *29~34
8200, A, 12, 930, -2, *1~13
8200, A, 12, 980, -2, *1~13
8200, A, 12, 1000, -2, *1~13
8500, A, 12, 770, -2, 3
8000, c, 0, 150, 200, 150, 8E-03
8800, c, 0, 20, 300, 100, -5E-03
9600, c, 0, 20, 200, 50, 3E-03
8600, SIGN, 5, 1000, 0, 1
   0, BSAV, 0, 5, 0, 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 23, 24, 26, 27, 28, 32,
35, 36, 37, 38, 44, 50, 18, 19, 21
   10000, ESAV
   0, RMSB, 0, Standart Deviations
   10000, RMSE
   10000, ES
```

G: Debriefing Form

KATILIM SONRASI BİLGİ FORMU

Bu araştırma, daha önce de belirtildiği gibi, ODTÜ Psikoloji Bölümü Trafik ve Ulaşım Psikolojisi Doktora programı öğrencisi Arş. Gör. Yeşim Üzümcüoğlu tarafından Doç. Dr. Türker Özkan danışmanlığında yürütülmektedir. Araştırmanın amacı, trafik ikliminin örtük ve beyana dayalı şekillerde ölçülerek, trafik iklimi ve sürücü davranışları arasındaki ilişkinin incelenmesidir.

Bu çalışmadan alınacak ilk verilerin Temmuz 2016 sonunda elde edilmesi amaçlanmaktadır. Elde edilen bilgiler sadece bilimsel araştırma ve yazılarda kullanılacaktır. Çalışmanın sağlıklı ilerleyebilmesi ve bulguların güvenilir olması için çalışmaya katılacağını bildiğiniz diğer kişilerle çalışma ile ilgili detaylı bilgi paylaşımında bulunmamanızı dileriz. Bu araştırmaya katıldığınız için tekrar çok teşekkür ederiz.

Araştırmanın sonuçlarını öğrenmek ya da daha fazla bilgi almak için araştırmacılara başvurabilirsiniz.

Yeşim Üzümcüoğlu (yuzumcu@metu.edu.tr)

Çalışmaya katkıda bulunan bir gönüllü olarak katılımcı haklarınızla ilgili veya etik ilkelerle ilgi soru veya görüşlerinizi ODTÜ Uygulamalı Etik Araştırma Merkezi'ne iletebilirsiniz.

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H: Turkish Summary / Türkçe Özet

Giriş

Her yıl 1,25 milyon insan trafik kazalarına bağlı olarak hayatını kaybetmektedir. İstatistikler, trafik kazalarında bölgesel farklılıkları göstermektedir (WHO, 2015). Benzer bir şekilde, sürücü davranışlarında da bölgesel farklılıklar bulunmaktadır (Lajunen, Parker ve Summala, 2004; Özkan ve ark., 2006; Warner, Özkan, Lajunen ve Tzamalouka, 2011). Bir ülkedeki trafik ortamının sürücü davranışlarını etkilediği ve sürücü davranışları arasındaki farklılıkların ülkeler arasındaki trafik iklimi farklılığına bağlı olabileceği düşünülmektedir.

Yol güvenliğini artırmak için planlanan girişimlere trafik ikliminin eklenmesi, yol güvenliğini artırmakta önemli bir adım olacaktır (Gehlert, Hagemeister ve Özkan, 2014). Trafik kültürü, dışsal faktörlerin, hareketliliğin ve trafikteki içsel faktörlerin geneli olarak tanımlanmaktadır (Özkan ve Lajunen, 2011). Trafik kültürünü anlamlandırabilmek için Özkan ve Lajunen (2015) G-TraSaCu-S adlı modeli geliştirmiştir. Bu model, yol trafik güvenliğine yeni bir bakış açısı getirmeyi amaçlamaktadır.

G-TraSaCu-S dört yatay seviyeden oluşmaktadır (mikro, mezo, makro, magna). Aynı zamanda uzak faktörler, kültürel bileşenler, yakın faktörler, çıktılar/sonuçlar ve ana hedefler gibi dikey seviyeleri de vardır. Bu çalışmada makro seviyede kültürel bileşenler ile yakın faktörler arasındaki ilişkinin incelenmesi hedeflenmiştir. Makro seviyede kültürel bileşenler ülkenin trafik iklimine yönelik tutumları, yakın faktörler ise sürücü davranışlarını içermektedir.

Trafik iklimi, yol kullanıcılarının belirli bir bölgede ve zamanda trafik bağlamına yönelik algı ve tutumları olarak tanımlanmaktadır (Özkan & Lajunen, yayımlanmamış). Yol kullanıcılarının trafik iklimini nasıl kavramsallaştırdığını

anlamak için Trafik İklimi Ölçeği (TİÖ) geliştirilmiştir ve üç ana boyuttan oluşmaktadır: dışsal duygu talepleri, işlevsellik, ve içsel gereksinimler. Diğer ülkelerde yapılan çalışmalar da ölçeğin üç boyutlu yapısını desteklemiştir (Chu, Wu, Atombo, Zhang, & Özkan, inceleme altında; Gehlert ve ark., 2014). Dışsal duygu talepleri, yol kullanıcıları tarafından trafikte yaşanılan duygusal katılım ile ilgilidir. İşlevsellik boyutu işlevsel bir trafik sistemi için gerekli güvenlik ve hareketlilik özellikleriyle ilişkilidir. İçsel gereksinimler ise trafiğe katılım için gerekli olan becerileri içermektedir (Gehlert ve ark., 2014).

Trafik kazalarının nedenleri genellikle insan hatasıdır. Sürücü becerisi/performansı ve sürücü tarzı/davranışları insan faktörünün iki ana başlığı olarak incelenmektedir (Elander ve ark., 1993; Evans, 1991). Sürücülerin araç kullanmayı tercih ettikleri tarza sürücü davranışları, bilgi işleme, motor ve güvenlik becerilerine ise sürücü performansı denmektedir (Elander ve ark., 1993). Bu çalışma, kültürel bileşenleri yakın faktörler arasındaki ilişkiyi incelemeyi amaçladığı için, odak sürücü davranışlarındadır.

Sürücü Davranışları Ölçeği (SDÖ), sürücü davranışlarını ölçmek için en sık kullanılan beyana dayalı ölçüm aracıdır (de Winter & Dodou, 2010). SDÖ, hatalar ve ihlaller ayrımına dayanan bir taksonomiye göre geliştirilmiştir (Reason, Manstead, Stradling, Baxter, & Campbell, 1990). İhlaller niyetli sürücü davranışlarını içerirken, hatalar niyetsiz sürücü davranışlarıyla ilgilidir.

Sapkın sürücü davranışlarının yanı sıra, doğası gereği sapkın olarak adlandırılamayacak diğer sürücü davranışları da bulunmaktadır. Trafik ortamında yardımcı olmaya ve kibar olmaya çalışan sürücüler de bulunmaktadır (Özkan & Lajunen, 2005). Bu davranışlar pozitif sürücü davranışları olarak isimlendirilmektedir ve herhangi bir kurala dayanmamaktadırlar.

Literatürde çalışmalar genellikle sürücü davranışları ve kazalardaki kültürel farklılıklara odaklanmıştır (Özkan ve ark., 2006). Bölgesel farklılıklar bilinse de, bunların altında yatan nedenlerin incelendiği çalışmalar kısıtlıdır ve altta yatan nedenlerden biri ülkelerde algılanan trafik iklimi olabilir.

Trafik iklimi ve sürücü davranışları arasındaki ilişkileri inceleyen çalışmalar, bu ilişkilerin kültürlerarası hem benzerlik hem de farklılıklar gösterebileceğini işaret etmektedir. Almanya'da yapılan bir çalışmada (Gehlert ve ark., 2014), içsel gereksinimler kazalar ile negatif ilişkiliyken, dışsal duygu talepleri ve işlevsellik pozitif ilişkilidir. Trafik bağlamını daha az içsel gereksinimli ve daha yüksek işlevsel algılayan sürücüler, daha fazla ihlal raporlamışlardır. Bir diğer değişle, Almanya örnekleminde, trafik iklimi pozitif algılandıkça, daha fazla sapkın davranışlar raporlanmıştır.

Trafik iklimi ve sürücü davranışları arasındaki ilişki Çin örnekleminde de çalışılmıştır (Chu ve ark., inceleme altında). İçsel gereksinimler ve işlevsellik sapkın sürücü davranışları ile negatif; pozitif sürücü davranışları ile ise pozitif ilişki göstermiştir. Dışsal duygu talepleri ise sapkın sürücü davranışlarıyla pozitif yönde ilişkilidir

Almanya ve Çin'deki çalışmalar, kültürlerarası hem benzerlikler hem de farklılıklar göstermektedir. Her iki ülkede de, düşük içsel gereksinimler, daha yüksek ihlaller ile ilişkilidir. Dışsal duygu talepleri ve işlevsellik ise tutarsız bulgular göstermiştir. Bu farklılıklar, kullanılan faktör yapısından olabileceği gibi, kültürlerarası farklılıklardan da kaynaklanabilir.

Bu çalışmada temel olarak trafik iklimi ve sürücü davranışları arasındaki ilişkiler incelenmiştir. Birinci kısımda, Türkiye ve Çin olmak üzere iki ülkede belirtilen ilişkiler karşılaştırılmıştır. İkinci kısımda ise, Türkiye'deki genç sürücülerde trafik ikliminin sürücü davranışlarıyla ilişkileri incelenmiştir. Birinci kısımda kullanılan beyana dayalı ölçeklere ek olarak, örtük tutum ölçekleri ve sürüş simülatörü kullanılmıştır.

ÇALIŞMA 1: Türkiye ve Çin Örneklemlerinde Trafik İklimi ve Sürücü Davranışları

Trafikteki kazalar ile mücadele etmek ve altta yatan farklılıkları anlamak için geliştirilen G-TraSaCu-S modelinde bulunan dört basamaktan, bu çalışmada makro

basamağına odaklanılmıştır. Bu basamakta, kültürel bileşenler (trafik iklimi) ile yakın faktörler (sürücü davranışları) arasındaki ilişkiler incelenmiştir. Türkiye ve Çin, orta gelir seviyesine sahip iki ülkedir (WHO, 2015). Türkiye ve Çin, nüfus olarak benzer olmadıkları için, her 100 000 kişideki ölüm oranları kriter olarak alınmıştır ve iki ülkenin bu oranlarda farklılıklar gösterdiği görülmüştür. Türkiye'de bu oran 8,9 gibi yüksek bir oran iken, Çin'de ise 18,8 olarak daha yüksek bir oranda raporlanmıştır. Bu çalışma, trafik iklimi ve sürücü davranışları arasındaki ilişkiyi Türkiye ve Çin'de test eden ilk çalışma olma özelliğini taşımaktadır.

Farklı ülkelerde yapılan çalışmalarda, trafik iklimi ve sürücü davranışları arasındaki ilişkiler olduğu ve bu ilişkilerin farklı örüntüler gösterdiği bulgulanmıştır. Bu yüzden, ülkeler arasında trafik iklimi ve sürücü davranışları arasında tutarlı örüntülerden bahsetmek zor olabilir. Bu çalışma, Türkiye ve Çin örneklerimdeki farklılıkları ve benzerlikleri görmek için yapılan bir keşif çalışmasıdır.

Yöntem

Katılımcılar

Bu çalışmada, Türkiye'den 294 kişi (139 kadın, 155 erkek) yer almaktadır ve yaşları 19 ile 61 arasında farklılık göstermektedir. Çin örneklemi ise 292 kişiden oluşmaktadır (137 kadın ve 155 erkek) ve yaşları 21 ile 64 arasında farklılık göstermektedir. Katılımcıların demografik özellikleri Tablo 1'de listelenmiştir.

Tablo 1. Katılımcıların demografik özellikleri

	Toplam		Kadın		Erkek	
	TR	Çin	TR	Çin	TR	Çin
N	294	292	139	137	155	155
Yaş						
Ortalama	31.72	34.72	31.04	33.21	32.34	36.05
SS	8.51	7.56	7.52	5.89	9.30	8.57
Sürüş deneyimi						
Ortalama	11.37	6.54	10.25	5.67	12.37	7.31
SS	7.82	4.60	7.03	3.88	8.37	5.04
Toplam kilometre						
Ortalama	115792.12	62856.21	57238.25	48278.48	168262.47	75803.53
SS	176534.34	69692.96	100442.40	50306.27	210665.16	81209.70

Ölçekler

Trafik İklimi Ölçeği (TİÖ), Sürücü Davranışları Ölçeği (SDÖ)

Prosedür

Öncelikle Orta Doğu Teknik Üniversitesi Uygulamalı Etik Araştırma Merkezi'nden etik onay alınmıştır. Daha sonrasında Çin'deki araştırmacılara çeviri işlemleri için ölçeklerin İngilizce versiyonları gönderilmiştir. Daha sonrasında ölçekler Qualtrics'e yüklenmiş ve iki ülkede de duyuruları yapılmıştır.

Bulgular ve Tartışma

TİÖ ve SDÖ için Türkiye ve Çin örneklemlerinde ayrı ayrı temel bileşen analizi yapılmıştır. TİÖ için yapılan temel bileşen analizlerinde iki ülkede de, daha önceki çalışmalarda bulunan üç faktörlü yapı desteklenmiştir (Chu ve ark., inceleme altında; Gehlert ve ark., 2014; Özkan ve Lajunen, yayımlanmamış). Önceki çalışmalarda faktörler dışsal duygu talepleri, işlevsellik ve içsel gereksinimler olarak adlandırıldığı ve bu çalışmadaki faktör yapıları benzer sonuçlar gösterdiği için, daha önce kullanılan faktör isimleri kullanılmıştır. TİÖ'nün faktör yapısı iki ülkede benzerlik gösterdiği için, TİÖ'nün trafik iklimini ölçmek için farklı kültürlerde kullanılabilecek bir ölçek olduğu söylenebilir.

Bulgular, TİÖ'nün faktörlerindeki maddelerin Türkiye ve Çin örneklemlerinde küçük farklılıklar gösterdiğine işaret etmektedir. Bu farklılıklar genellikle dışsal duygu talepleri ve içsel gereksinimler faktörlerinde yer almaktadır. Farklılık gösteren bu maddeler, Çin örnekleminde genellikle dışsal duygu talepleri faktörüne yüklenirken, Türkiye örnekleminde içsel gereklilikler faktörüne yüklenmiştir. Bu farklılıklara bağlı olarak, Türkiye'deki sürücülerin trafikte deneyimlenebilecek olumsuz duyguları "başa çıkma becerileri" gerektiren duygular olarak algıladığı ve bu yüzden içsel gereklilikler faktörüne yüklendiği söylenebilir.

SDÖ ölçeği ise, literatürdeki diğer bulgular ile benzerlik göstererek ihlaller ve hatalar olarak ikiye ayrılmıştır. Doğası gereği içeriği farklı olan pozitif sürücü

davranışları ayrıca temel bileşen analizine tabi tutulmuştur ve sonuçları literatür ile benzerlik göstererek tek faktörlü yapıyı desteklemiştir.

Korelasyon Analizleri

Türk örnekleminde yaş işlevsellik ile pozitif ilişkiliyken Çin örnekleminde negatif yönde ilişkilidir. Toplam kilometre dışsal duygu talepleri ile pozitif yönde ilişkiliyken, Çin örnekleminde bu ilişki bulunamamıştır. Daha önceki çalışmalarda yaş ve trafik iklimi arasındaki ilişkilerde tutarsız sonuçlar raporlanmıştır (Chu ve ark., inceleme altında; Zhang ve ark., 2018). Hem literatürdeki hem de bu çalışmadaki farklı örüntüler, yaş ve trafik iklimi arasındaki ilişkinin ileriki çalışmalarda daha detaylı incelenmesi gerektiğine işaret etmektedir.

Yaş ve sürücü davranışları arasındaki ilişkiler incelendiğinde, Türkiye örnekleminde yaş sadece ihlaller ile negatif yönde ilişkili görülmektedir. İhlaller sürücülerin aracı nasıl sürmeyi tercih ettikleri ve alışkınları ile ilişkilidir ve deneyim ile şekillenir (de Winter ve Dodou, 2010). Türkiye'de ilişkili fakat Çin'de anlamsız olan yaş ve ihlaller arasındaki ilişki, Türkiye'deki sürücülerin daha genç ve daha fazla toplam kilometreye sahip olması ile açıklanabilir.

Karşılaştırma Analizleri: Trafik İklimi

TİÖ'nün maddeleri ve faktörleri Türkiye ve Çin örneklemlerinde karşılaştırılmıştır. TİÖ'nün madde bazlı analizlerinde tüm maddeler anlamlı olarak farklılık göstermiştir. Bu farklılıkların etki büyüklükleri düşükten yükseğe değişmektedir. Madde bazlı ve faktör bazlı karşılaştırmalar dikkate alındığında, yüksek etki büyüklüğü gösteren maddeler iki örüntü sergilemektedir. Birinci örüntü Türk sürücülerinin Çinli sürücülerden yüksek puana sahip olduğu 11 madde ile ilişkilidir. Bu 11 maddeden dokuz tanesi iki örneklemde farklı faktörlere yüklenmiştir ve trafikte yaşanabilecek negatif duygular ile ilişkilidir. Bu maddeler Türkiye örnekleminde içsel gerekliliklere yüklenirken, Çin örnekleminde dışsal faktörlere yüklenmiştir. Türk örneklemindeki sürücülerin bu duyguları "başa çıkma becerileri gerektiren" duygular olarak algıladığı söylenebilir. Türk sürücüler bu duyguları

içselleştirmişken, Çin'deki sürücüler değiştirilebilir duygular olarak algılayıp dışsallaştırmış olabilirler. Bu farklılıklar, Türkiye'nin uyumluk, Çin'in ise hakimiyet değerleri ile ilişkili olabilir (Schwartz, 2006).

İkinci örüntü ise Çinli sürücülerin Türk sürücülerden yüksek puan verdiği 10 madde ile ilişkilidir ve bu maddelerden dokuzu her iki ülkede de işlevsellik faktörüne yüklenmiştir. Bir diğer değişle, Çin'de trafik ortamı Türkiye'ye göre daha işlevsel olarak algılanmaktadır. Bu farklılık, Çin kültüründeki uzun dönem odaklılık ve Türk kültüründeki kısa dönem odaklılık ile açıklanabilir (Hofstede, 2001). Çin'de güvenlik ile ilişkili gelişmeler ve stratejiler işlevselliği arttırmış olabilir.

Yüksek etki büyüklüğü gösteren iki faktör dışsal duygu talepleri ve işlevselliktir. Bu iki faktör de literatürdeki çalışmalarda istenmeyen trafik davranışları ile pozitif ilişki göstermiştir (Chu ve ark., inceleme altında; Gehlert ve ark., 2014).

Türkiye ve Çin arasındaki ölüm oranlarındaki farklılıklar (WHO, 2015) bu iki boyuttaki farklılıklara bağlı olabilir. Madde bazlı karşılaştırmalardaki açıklamalarda kullanılan Türkiye'nin uyumluluk ve Çin'in hakimiyet değerleri ve uzun dönem odaklılığı bu farklılıklara neden olabilir (Schwartz, 2006)

Sonuçlar, Türkiye'de trafik iklimi için cinsiyete bağlı farklılık göstermezken, Çin'de ise kadın sürücüler trafik iklimini, erkek sürücülere göre daha içsel gereksinimli bulmuşlardır. Bu sonuçlar, sürücü davranışlarındaki cinsiyet farklılıkları ile benzer bir örüntü sergilemektedir. Çin'deki kadın sürücüler, Çin'deki erkek sürücülere göre daha fazla hata göstermişlerdir. Hatalar sürücülerin performans kısıtlılıkları ve becerileri ile yakından ilişkilidir. Kadın sürücülerin daha fazla beceri gerektiren bir trafik ortamında daha fazla hata sergiledikleri söylenebilir. Fakat, iki analizde de farklılıkların düşük etki büyüklüğüne sahip olduğu göz önüne alınmalıdır.

Karşılaştırma Analizleri: Sürücü Davranışları

Madde bazlı ve faktör bazlı karşılaştırmalar birlikte ele alındığında, iki örüntü görülmektedir. Birinci örüntü ihlaller ile ilgili maddelerde görülmektedir. Türk örnekleminin Çin örnekleminden daha yüksek puan verdiği maddeler ihlaller ile

ilişkilidir. Yüksek etki büyüklüğüne sahip olan maddeler özelikle hız ile ilgilidir. Faktör bazlı karşılaştırmalarda da Türk sürücülerin Çinli sürücülerden daha fazla ihlal rapor ettiği görülmektedir. Türk sürücüler aynı zamanda kendi trafik iklimlerini daha az işlevsel olarak algılamaktadır. Türkiye'de trafik ikliminin işlevselliği için yapılacak müdahaleler, ihlallerin azalmasını sağlayabilir.

İkinci örüntü ise hatalar ile ilişkilidir. Çin sürücüler, Türk sürücülere göre daha fazla hata belirtmişlerdir. Faktör bazlı analizlerde de sonuç aynı yöndedir. Bu farklılığın altında yatan neden içsel gereklilikler olabilir. İçsel gereklilikler trafik ortamında gerekli beceriler ile ilişkilidir ve Türkiye'de daha yüksek algılanmaktadır. Daha yüksek becerilere ihtiyaç duyulması, Türkiye'deki hataların daha az olması ile ilişkili olabilir. Bir diğer açıklama ise Çin'de daha yüksek algılanan işlevsellik olabilir. Yol kullanıcıları trafik ortamını daha işlevsel algıladıkça, trafik ortamını daha az riskli görüyor ve buna bağlı daha fazla hata sergiliyor olabilirler (Gehlert ve ark., 2014). Pozitif sürücü davranışlarının maddelerine bakıldığında ise, Çin örnekleminde daha yüksek puanlar görülmektedir. Bu farklılık, Çin'deki toplulukçu kültür ve kendileri "biz" olarak tanımlamaları ile ilişkili olabilir (Hofstede, 2001).

Türk sürücüler, ihlallerde daha yüksek puan gösterirken, Çinli sürücüler ise hata faktöründe daha yüksek puan göstermişledir. Demografik değişkenlerinin çalışma değişkenleri ile ilişkilerine bakıldığında, bulgular kısmen literatürle uyumludur (de Winter ve Dodou, 2010); ihlaller, Türk örnekleminde genç yaş, erkek cinsiyet ve yüksek kilometre; Çin'de ise hatalar ve kadın cinsiyet arasındaki ilişki bulunmaktadır. İki örneklem arasında farklılıklar gösteren iki boyut da, kendi örneklemleri içinde cinsiyetler arasında anlamlı farklılıklar göstermiştir. Diğer bir ifadeyle, Türk örnekleminde ihlaller Çin örneklemine göre daha fazlayken ve Türk erkek sürücüler, Türk kadın sürücülerinden daha fazla sayıda ihlal raporlamışlardır. Ayrıca, Çin örnekleminde hatalar Türk örneklemine göre daha yüksekken ve Çinli kadın sürücüler ise Çinli erkek sürücülerden daha fazla hata raporlamıştır. Cinsiyete dayalı karşılaştırmalar, sürücü davranışları için ülke bazlı karşılaştırmalarda benzer modeller göstermiştir. Dolayısıyla, cinsiyete dayalı farklılıkların ülke temelli farklılıklar üzerinde etkili olabileceği sonucuna varılabilir.

Regresyon Analizleri: Trafik İklimi ve Sürücü Davranışları

Trafik iklimi ile sürücü davranışları arasındaki ilişkileri incelemek için hiyerarşik regresyon analizleri yapılmıştır. Tüm analizlerde kontrol değişkenleri olarak ilk adımda yaş, cinsiyet ve toplam kilometre kullanılmıştır. İkinci aşamada, TİÖ'nün alt ölçekleri (dışsal duygu talepleri, işlevsellik ve içsel gereksinimler) kullanılmıştır. Analizler, her bir SDÖ alt ölçeği ve iki örneklem için ayrı ayrı yapılmıştır.

Türkiye ve Çin örneklemleri arasında sonuçlara göre hem benzerlikler hem de farklılıklar görülmüştür. Dışsal duygu talepleri, hem Türkiye'de hem de Çin'de tüm sürücü davranışları ile ilişkisi olan tek faktör olmuştur. Dışsal duygu talepleri ihlaller ve hatalar ile pozitif ilişkilidir. Etki büyüklüklerine göre, bu ilişkilerin Türkiye'de daha güçlü olduğu söylenebilir. Sürücüler, trafik iklimini daha dışsal talepli bir şekilde algıladıkça, daha fazla ihlal ve hata göstermişlerdir. Dışsal duygu talepleri ile trafikte istenmeyen durumlar ile arasındaki aynı örüntü, Çin'de yapılan önceki çalışmalarda (Chu ve ark., inceleme altında) ve Almanya'da da bulunmuştur (Gehlert ve ark., 2014). Mevcut çalışmanın ve önceki literatürün sonuçları göz önünde bulundurulduğunda, yüksek dışsal duygu taleplerinin bir ülkenin karayolu trafik güvenliği üzerinde olumsuz etkileri olabileceği sonucuna varılabilir.

Trafik iklimi ile pozitif sürücü davranışları arasındaki ilişkiler, Türk ve Çinli sürücüler arasında benzerlik göstermiştir. Pozitif sürücü davranışları dışsal duygu talepleri ile negatif yönlü, içsel gereklilikler ile pozitif yönlü ilişkilidir. Etki büyüklüklerine göre, belirtilen ilişkilerin Çin'de daha güçlü olduğu söylenebilir. Daha önce, trafik iklimi ile pozitif sürücü davranışları arasındaki ilişki sadece Çin'de incelenmiştir (Chu ve ark., Gözden geçirme altında) ve mevcut çalışmanın sonuçları aynı doğrultuda olup, iç gereksinimler ile pozitif sürücü davranışları arasında pozitif bir ilişki olduğunu göstermektedir. Trafik ortamını bilişsel olarak daha zorlayıcı olarak algılayan sürücüler daha çok pozitif sürücü davranışları göstermektedir. Dışsal duygu talepleri ile pozitif sürücü davranışları arasındaki negatif ilişki, trafik ortamını daha duygusal olarak talepkar olarak algılayan sürücülerin daha az olumlu davranış sergiledikleri anlamına gelmektedir. Trafikte daha düşük dışsal duygu

talepleri ve daha yüksek iç gereksinim algılanırken, hem Türkiye'de hem de Çin'de daha olumlu sürücü davranışları gözlemlenmektedir. Her iki kültürde de, iç gereksinimler ile pozitif sürücü davranışları arasındaki ilişki, dışsal duygu talepleri ile pozitif sürücü davranışları arasındaki ilişkiden daha güçlüdür. Sürücüler, davranışların kendisini değil fakat pozitif sürücü davranışlarını sergileyebiliyor olmayı trafik bağlamında sürüş becerisi olarak algılıyor olabilirler.

Türk ve Çin örneklemlerinde trafik iklimi ve sürücü davranışları arasındaki ilişkiye yönelik iki farklı örüntü gözlemlenmiştir. Birincisi, Türkiye'de trafik daha çok işlevsel algılandıkça daha az ihlal belirtilmiştir. Aynı sonuç, Çin'de daha önce yapılan başka bir çalışmada da bulunmasına rağmen (Chu ve ark., İnceleme altında), bu çalışmada Çin örneğinde bahsedilen ilişki anlamlı bulunmamıştır. İki çalışmanın demografik özellikleri karşılaştırıldığında, ortalama yaşlar arasında farklılık bulunmaktadır. Bu çalışmadaki Çin örnekleminin yaş ortalaması 34,72 iken, diğer çalışmada 44,59 olarak belirtilmiştir (Chu ve ark., İnceleme altında). Her iki çalışmada da yaş, işlevsellik ile negatif ilişki göstermiştir. İki çalışma arasındaki tutarsız bulgular, iki örneklemin yaşlarındaki farklılıklara bağlı olabilir.

İkinci olarak, Çin'de iç gereklilikler ihlaller ile negatif yönde ilişki göstermiştir ve önceki bulgular ile aynı yöndedir (Chu ve ark., Gözden geçirme altında; Gehlert ve ark., 2014; Zhang ve ark., 2018). Sürücüler trafik ortamını bilişsel olarak daha yüklü ve beceri gerektiren olarak algıladıkça daha az ihlal ve sapkın sürücü davranışı göstermişlerdir. Türkiye ve Çin örneklemin demografik değişkenleri arasındaki farklılıklara bağlı olarak Türkiye örnekleminde bu ilişki bulunamamış olabilir. Türkiye'deki yüksek ihlallerin nedeni, trafik ortamında algılanan gerekli becerilerden ziyade demografik özellikler olabilir.

Sonuçlar, iki kültürdeki ilişki örüntülerinin benzerliklere sahip olduğunu göstermiştir, ancak iki örneklemde etki büyüklüklerinin farklılıklarına dikkat edilmelidir. Örnek vermek gerekirse, her iki örneklemde de dışsal duygu talepleri ve sapkın sürücü davranışları arasında anlamlı bir ilişki görülmüştür. Ancak, belirtilen ilişkiler Türkiye örnekleminde daha güçlüdür. Dışsal duygu taleplerinin

Türkiye'deki sapkın sürücü davranışları ile yakından ilişkili olduğu sonucuna varılabilir. Trafik ortamında dışsal duygu taleplerini azaltmaya yönelik müdahaleler ve girişimler, Türkiye'de karayolu trafiği güvenliği üzerinde olumlu etkileri gösterebilir. Trafik iklimi ile pozitif sürücü davranışları arasındaki ilişki, sapkın sürücü davranışlarından farklı bir örüntü göstermektedir. Çin örnekleminde trafik iklimi ile pozitif sürücüler arasındaki ilişki Türk örnekleminden daha güçlüdür. Çin'de trafik ortamının pozitif sürücü davranışları üzerindeki etkileri, anormal sürücü davranışlarına olan etkilerinden daha güçlüdür. Türkiye, Schwartz'ın kültürel değerlerinin uyum boyutunda yüksek bir toplumdur (2006). Bu toplumlarda insanlar sosyal çevreyi değiştirmeye çalışmazlar ama kendileri uyum göstermeye çalışırlar. Dolayısıyla, trafik ortamlarını daha duygusal olarak yüklü algıladıkları için, ihlalleri daha fazla gösterebilirler. Öte yandan, Çin kültürünün hakimiyet boyutu üzerinde yüksek olduğu ve bu toplumlarda insanların kendi çevrelerini korumak için sosyal çevrelerini manipüle etmeye daha yatkın oldukları söylenebilir (Schwartz, 2006). Bu nedenle, trafik sistemini rahatlatmak için pozitif sürücü davranışları göstermeye daha eğilimli olabilirler.

Karayolu trafiği ölüm oranları Türkiye ile Çin arasında farklı olsa da, trafik iklimi ile sürücü davranışları arasındaki ilişkiler, farklılıklardan çok benzerlikler göstermiştir. Trafik ortamı, Türkiye'de ve Çin'de duygusal olarak zorlayıcı olarak algılandığında, ihlallerin ve hataların sıklığı artmış, pozitif sürücü davranışlarının sıklığı ise azalmıştır. Bu ilişkiler, karayolu trafiği güvenliği için istenmeyen sonuçlar oluşturabilir. Trafik ortamı bilişsel olarak daha yoğun algılandığında, yol trafik güvenliği için olumlu bir sonuç olabilecek pozitif sürücü davranışları daha fazla rapor edilmiştir. İki örneklem arasında benzerlikler olduğu gibi farklılıklar da bulunmaktadır. Türkiye'de yol güvenliğini arttırmak için daha işlevsel algılanan bir trafik ortamı önemlidir. Çin'de ise yol güvenliğini arttırmak için daha yüksek iç gereksinimler önemlidir (Chu ve ark., inceleme altında; Zhang ve ark, 2018). Dünya çapında, yol güvenliğini arttırarak trafik kazalarını ve ölümleri azaltmayı amaçlayan girişimlerde bulunulmaktadır. Ancak, bu girişimler kültürler ve ülkeler arasındaki farklılıklara göre planlanmalıdır. Bu şekilde, insan faktörü trafik sistemine dahil

edilebilir. Örneklendirmek gerekirse, trafik bağlamında daha yüksek beceriler gerektiren bir ortam Çin'deki trafik güvenliğini artırabilir; ancak Türkiye'de etkili olmayabilir. Ek olarak, bir ülkedeki sürücülerin demografik özellikleri, bazı kültürlerdeki yüksek ihlaller veya hatalarla yakından ilişkili olabileceği göz önünde bulundurulmalıdır. Sonuç olarak, bulgular, bir ülkenin trafik ortamının sürücü davranışlarını etkileyebileceğini ve sürücü davranışlarındaki farklılıkların algılanan trafik iklimindeki farklılıklar ile ilgili olabileceği varsayımını desteklemiştir.

Kısıtlılıklar ve İleriki Çalışmalar için Öneriler

Sadece beyana dayalı anketler kullanımı ortak yöntem yanlılığına neden olmuş olabilir. Tutumları ölçmek için beyana dayalı raporlama yöntemlerini kullanmak, sosyal istenirliğe dayalı olarak sonuçları etkileyebilir (Hoffman, Gawronski, Gschwendner, Le ve Schmitt, 2005). Tutumlar iki farklı düzeyde bulunabilir: açık tutumlar ve örtük tutumlar. Açık tutumlar kolaylıkla rapor edilebilir ve bilinçli olarak onaylanabilir ve çoğunlukla beyana dayalı yöntemler ile ölçülür. Örtük tutumlar kontrol edilemez ve bilinçsiz değerlendirmeleri içerir (Fazio ve Olson, 2003; Greenwald ve Banaji, 1995; Wilson, Lindsey ve Schooler, 2000). Çalışma 1'de, sürücülere, trafik durumuyla ilgili algılarını beyana dayalı bir şekilde sorulmuştur. Sürücülerin trafik iklimi hakkındaki bilinçli değerlendirmeleri, çeşitli deneyimleri, kendi sürüş becerileri ve genellikle gerçekleştirdikleri sürücü davranışlarına ilişkin algılardan etkilenebilir. Sürücülerin trafik iklimiyle ilgili örtük değerlendirmelerini incelemek için, daha sonraki çalışmalarda örtük ölçümler kullanılabilir.

Öz-bildirim önlemleri birçok avantajın yanında bazı dezavantajlara da sahiptir (Lajunen ve Özkan, 2011). Beyana dayalı ölçümler ile sürücü davranışları hakkında bilgi almak yanıltıcı veya yanlı olabilir. SDÖ hem hatalar hem de ihlaller hakkında maddeler içermektedir. Hatalar, kasıtsız sapkın sürücü davranışlarıyla, ihlaller ise kasıtlı sapkın sürücü davranışları ile ilgilidir. Sürücüler, kasıtlı olmayarak sürüş sırasında yaptıkları hataların farkında olmayabilirler. Bu nedenle sürücülerin hatalarını eksiz bir şekilde rapor etmeleri mümkün değildir (Lajunen ve Özkan, 2011). Ek olarak, sonuçlar özellikle ihlallerle ilgili maddeler için sosyal istenirlikten

(Lajunen ve Summala, 2003) etkilenebilir. İleriki çalışmalara simülatörden ve/veya donanımlı araçlardan elde edilecek veriler çalışmalara dahil edilerek, ile belirtilen sınırlamaların üstesinden gelinebilir.

ÇALIŞMA 2: Açık ve Örtük Tutumlar: Trafik İklimi

Giriş

Örtük Ölçümler

Tutumlar, kişilerin bir nesne hakkında geliştirdikleri olumlu veya olumsuz değerlendirmelerdir (Ajzen, 2001). Tutumların insan davranışlarını anlamada merkezi bir rolü olduğu varsayılmaktadır (Kraus, 1995). Kişilerin kendi deneyimlerini organize etmek ve yapılandırmak için faydalıdırlar (Katz, 1960). Trafik bağlamında tutumların işlevleri göz önünde bulundurulduğunda, yol kullanıcılarının trafik koşullarına yönelik tutumlarının trafik durumlarını değerlendirmek için kullandıkları trafik güvenliği ile ilgili bilgi ve beklentilerini içerdikleri söylenebilir (Gehlert ve ark., 2014). Tutumlar ve davranışlar arasındaki ilişkiye dayanarak, trafik iklimine karşı tutumlar ve sürücü davranışları arasındaki ilişkiler için de benzer çıkarımlarda bulunulabilir (Chu ve ark., Gehlert ve ark. al., 2014).

Tutumlar iki düzeyde var olabilir: açık ve örtük. Açık tutumlar raporlanabilirler ve bilinçli değerlendirmeler içerirler. Bir diğer deyişle, açık tutumlar, bir nesne hakkında insanların bilinçli değerlendirmeleridir. Beyana dayalı anketler, açık tutumları ölçmek ve nesnelerin bilinçli temsilleri hakkında bilgi alabilmek için kullanılır. Açık tutumlar bilinçli yargılar içerdiğinden, önyargılara açıktır (Hoffman, Gawronski, Gschwendner, Le ve Schmitt, 2005). Öte yandan, örtük tutumlar iç gözlem içermez ve insanlar örtük tutumları üzerinde kontrol sahibi değildir (Devos 2008; McKenzie ve Gilmore 2017). Örtük ölçüm yöntemleri, nesnelerin bilinçsiz temsilleri hakkında bilgi verir (Greenwald ve Banaji, 1995). Örtük ölçüm yöntemlerinde, katılımcılar zihinleri ile tutum nesnesi arasındaki otomatik ilişkiyi temel alan sorulara cevap verirler (Rudman, 2011) ve insanlar bu otomatik

ilişkilerden haberdar değildirler (Fazio ve Olson, 2003). Bu nedenle örtük tutumların sosyal istenirlikten etkilenmeye daha az eğilimli oldukları varsayılmaktadır (Gawronski, LeBel ve Peters, 2007).

En yaygın kullanılan örtük önlem Greenwald, McGhee ve Schwartz (1998) tarafından geliştirilen Örtük Çağrışım Testi'dir (ÖÇT). ÖÇT, insanların zihinlerinde verilen terimler ve/veya kavramlar arasındaki örtülü ilişkileri gecikme önlemlerini kullanarak ölçen basit bir sıralama görevidir. Bilgisayar tabanlı reaksiyon süresi hesaplanır ve katılımcılardan kavramları olabildiğince çabuk eşleştirmeleri istenir. Katılımcılar, beyinlerinde daha yakından ilişkili olan kavramlara daha hızlı yanıtlar verilir. ÖÇT'de iki farklı tutum nesnesi ve iki zıt değerlendirme boyutu vardır. Puanlar, her bir deneyde katılımcıların yanıt gecikme süreleri karşılaştırılarak hesaplanır.

Literatürde, trafikle ilgili tutumları değerlendirmek için örtük testler kullanan sınırlı sayıda çalışma bulunmaktadır (Fulcher, Parkhurst, Alford ve Musselwhite, 2014; Harré ve Sibley, 2007). Diğer alanlarda örtük ve açık ölçümleri kullanan çalışmalara benzer şekilde, trafikle ilgili değişkenlerin örtük ölçümleri için düşük korelasyonlar rapor edilmiştir. Riskli ve güvenli sürüşe yönelik tutumları ve beyana dayalı sürücü davranışları ile sürüş becerileri arasındaki ilişkileri inceleyen bir çalışmada, örtük ve açık tutumlar arasında düşük korelasyonlar bulunmuştur (Martinussen, Sømhovd, Møller ve Siebler, 2015). Başka bir çalışmada, hıza yönelik tutumlar hem örtük hem de açık olarak ölçülmüştür. Bulgular, hıza yönelik hem örtük hem de açık tutumların ihlallerle pozitif korelasyonlara sahip olduğunu ortaya koymuştur. Ek olarak, hıza yönelik açık ve örtük tutumlar arasında anlamlı bir düşük korelasyon bulunmuştur (Rusu, Sârbescu, Moza ve Stancu, 2017).

Literatürde, sürüş becerilerine yönelik örtük ve açık tutumlar da incelenmiştir. Öztürk (2017), açık tutumların beyana dayalı sürücü davranışları ve simülatörde ölçülen sürüş davranışları ile ilişkili olduğunu, ancak örtük tutumların sürücü davranışları ile anlamlı ilişkilerinin olmadığını raporlamıştır. Çalışmanın yaş aralığının, genç sürücüler olarak nitelendirilen ve trafikte riskli bir grup olan 18-25

arasında olduğu unutulmamalıdır. Bıçaksız, Harma, Doğruyol, Lajunen ve Özkan (2018) da, sürüş becerilerine karşı hem örtük hem de açık tutumlar üzerinde çalışmışlardır. Sürüş becerilerine ve trafikle ilgili değişkenlerine yönelik örtük ve açık tutumlar arasındaki ilişkiler farklı örüntüler göstererek, sürüş becerilerine yönelik açık ve örtük tutumların birbirinden farklı olabileceğini ve farklı bilişsel yollar kullanabileceğini düşündürmektedir.

ÖÇT'de iki tutum kategorisi (iyi - kötü) ve iki değerlendirme kategorisi (Türkiye - Çin) kullanılmaktadır. Bir kişi söz konusu olan bir değerlendirme kategorisine yönelik bir tutuma sahip olmayabilir. Örneğin, Türkiye'de yaşayan, ancak Çin'de hiç bulunmayan bir kişi Çin'deki trafik ortamına yönelik bir tutum sahibi olmayabilir. Bu nedenle, bazı araştırma sorularının sadece tek bir değerlendirme kategorisine yönelik tutumları ölçmesini gerektirebileceği önerilmiştir. Bu nedenle, Tek Kategori-Örtük Çağrışım Testi (TK-ÖÇT; Karpinski ve Steinman, 2006), tek bir değerlendirme kategorisine (Trafik) ilişkin iki tutum kategorisi (iyi ve kötü) arasındaki ilişkiyi ölçmek için geliştirilmiştir. Bu çalışmada, katılımcıların Türkiye'deki trafik iklimine yönelik tutumlarını ölçmek için TK-ÖÇT kullanılmıştır.

Sürüş Simülatörü

Sürüş simülatörleri de, beyana dayalı ölçümler gibi trafikle ilgili araştırmalarda yaygın olarak kullanılmaktadır (Carsten & Jamson, 2011). Simülasyon çalışmaları, yolda yapılan testlerde mümkün olmayan, tekrarlanabilir durumlar ve senaryolar sağlayarak kontrol edilebilir bir ortam sağlamaktadır. Ayrıca, sürüş simülatörlerini kullanmak, güvenilir bir sürüş değerlendirme yöntemidir (de Winter, Groot, Mulder, Wieringa ve Dankelman, 2009). Sürüş simülatörlerinin ve gerçek sürüş davranışlarındaki davranışların benzerlik gösterdiğini bulgulayan çalışmalar bulunmaktadır. Bu da sürüş simülatörünün kullanımının güvenilir bir ölçüm aracı olduğunu göstermektedir (Palat ve Delhomme, 2016).

Sürüş simülatörü çalışmalarında çoğunlukla hız (Bella, 2008; Helman ve Reed, 2015; Öztürk, 2017), risk algısı (Erkuş, 2017), trafik ışıklarına uyma (Meuleners & Fraser, 2015) ve şerit takibi (Meuleners ve Fraser, 2015; Öztürk, 2017) çalışılmıştır.

Ancak, simülatörde ölçülen sürüş davranışları ile SDÖ arasındaki ilişkileri araştıran çalışmalar sınırlıdır. Helman ve Reed (2015), simülatörde ölçülen hız ile SDÖ ihlalleri arasındaki .38 ile .48 arasında bir ilişki olduğunu göstermiştir. Şerit takibine odaklanan çalışmalar SDÖ ile ilişkisini incelememiştir, ancak trafik koşullarının (Brill, Shirkey ve Alberti, 2009; Mecheri, Rosey ve Lobjois, 2017), araç otomasyonunun (Madigan, Louw ve Merat, 2018), araba kullanırken oyun oynamanın (Postelnicu, Machidon, Girbacia, Voinea ve Duguleana, 2016), tetiklik durumunun (Larue, Rakotonirainy ve Pettitt, 2011) ve yol özelliklerinin (Oron-Gilad & Ronen, 2007) şerit takibini etkilediği bulunmuştur. Bu çalışmada, simülatördeki sürücü davranışlarından hız ve şerit takibinin ortalamaları ve standart sapmaları kullanılmıştır.

Trafik iklimine yönelik açık tutumlar ve beyana dayalı sürücü davranışları arasındaki ilişki daha önce literatürde incelenmiştir. Bu çalışmada, trafik iklimine yönelik açık tutumlara ve beyana dayalı sürücü davranışlarına ek olarak, simülatördeki sürücü davranışları ve trafik iklimine yönelik örtük tutumlar da incelenmiştir. Ayrıca, aynı ilişkiler, ilk kez sadece genç sürücüler için test edilmiştir. Belirtilen ilişkilerin arkasındaki psikolojik süreçleri anlamak için, hem açık hem de örtük ölçümlerim kullanımı, bu konuda daha ayrıntılı bilgi sağlayacaktır.

Yöntem

Katılımcılar

Çalışmada toplam 78 katılımcı bulunmaktadır. Örneklemde kadın ve erkek sayısı eşittir. Katılımcıların yaş aralığı 18 – 25'tir. Katılımcıların hepsi en az 2500 km araç kullanmışlardır. Katılımcıların demografik özellikleri Tablo 2'de sunulmuştur.

Ölçekler

Trafik İklimi Ölçeği, Sürücü Davranışları Ölçeği, Tek Kategori – Örtük Çağrışım Testi – Trafik İklimi, Sürüş Simülatörü

Tablo 2. Katılımcıların demografik özellikleri

	Toplam	Kadın	Erkek
N	78	39	39
Yaş			
Ortalama	22.28	22.44	22.13
SS	1.64	1.74	1.53
Sürüş deneyimi			
Ortalama	3.68	3.68	3.69
SS	1.55	1.63	1.49
Toplam kilometre			
Ortalama	33867.11	26181.58	41552.63
SS	35116.81	27305.70	40407.68

Prosedür

İlk olarak Orta Doğu Teknik Üniversitesi Uygulamalı Etik Araştırma Merkezi'nden etik onay alınmıştır. Katılımcılar öncelikle demografik bilgi formu, Trafik İklimi Ölçeği, Sürücü Davranışları Ölçeğinden oluşan bir test bataryasını doldurmuşlardır. Daha sonrasında sürüş simülatöründe bir test sürüşü tamamlayıp, ardından 1900 metreden oluşan senaryoyu tamamlamışlardır. En son olarak, Tek Kategori – Örtük Çağrışım Testi – Trafik İklimi'ni tamamlamışlardır. Çalışmaya katılım gösteren kişilere süreç sonunda 60 TL'lik ödeme yapılmıştır.

Bulgular ve Tartışma

TİÖ ve SDÖ için temel bileşen analizi yapılmıştır. SDÖ için yapılan temel bileşen analizlerinde daha önceki çalışmalarda da bulunan üç faktörlü yapı desteklenmiştir (Chu ve ark., inceleme altında; Gehlert ve ark., 2014; Özkan ve Lajunen, yayımlanmamış). Önceki çalışmalarda faktörler dışsal duygu talepleri, işlevsellik ve içsel gereksinimler olarak adlandırıldığı ve bu çalışmadaki faktör yapıları benzer sonuçlar gösterdiği için, daha önce kullanılan faktör isimleri kullanılmıştır.

SDÖ ölçeği ise, literatürdeki diğer bulgular ize benzerlik göstererek ihlaller ve hatalar olarak ikiye ayrılmıştır. Doğası gereği içeriği farklı olan pozitif sürücü

davranışları ayrıca temel bileşen analizine tabi tutulmuştur ve sonuçları literatür ile benzerlik göstererek tek faktörlü yapıyı desteklemiştir.

Korelasyon Analizleri

Toplam kilometre, ihlal, ortalama hız, hızın standart sapması ve şerit takibinin standart sapması ile pozitif ve şerit takibi ile negatif ilişki göstermiştir. Toplam kilometre ve ihlaller arasındaki ilişki önceki çalışmalarda da pozitif olarak bulgulanmıştır (de Winter ve Dodou, 2010). Trafiğe daha fazla maruz kalmanın daha fazla ihlalle neden olabileceği düşünülmüştür (Zhang, Jiang, Zheng, Wang ve Man, 2013). Genç sürücüler arasında ihlaller yaşla birlikte artış göstermektedir (de Winter ve Dodou, 2010). Mevcut çalışmanın sonuçları bu bulguyu desteklemektedir ve ayrıca sınırlı deneyime sahip, kısıtlı bir yaş grubunda dahi, kilometre ve ihlaller arasındaki ilişki hala belirgindir. Simülasyondan elde edilen sürücü davranışlarına ilişkin olarak, daha fazla toplam kilometreye sahip sürücülerin daha yüksek ortalama hız, daha fazla hız varyansı ve daha fazla şerit değişimi gösterdiğini ortaya koymuştur. Simülatör senaryosundaki yolun, sürücünün tercihlerini etkileyebilecek bir şeritli yol olduğu belirtilmelidir.

Trafik ikliminin alt faktörleri arasındaki ilişkiler, örtük ve açık tutumlar için ayrı ayrı incelendiğinde, farklı örüntüler gözlenmiştir. İşlevselliğe yönelik açık tutumlar, dışsal duygu talepleri ile pozitif ve iç gerekliliklerle negatif olarak ilişkilidir. İşlevsellik ve iç gereksinimlere yönelik örtük tutumlar ise pozitif yönde ilişki göstermektedir ve açık tutumlarla karşılaştırıldığında zıt yöndedir. Bu farklı örüntüler, örtük ve açık tutumların farklı psikolojik süreçlere sahip olabileceği görüşünü desteklemektedir (Hoffman ve ark., 2005). Örtük ve açık tutumlar arasındaki ayrım işlevsellik boyutunda daha belirgin olabilir. Bu boyut, ulusal düzeyde bazı faktörlerden etkilenebilir. İşlevsellik boyutu, yönetişim kalitesiyle ilgili "yaptırım altında", "caydırıcı kurallar içeren" gibi maddeleri içerir. Genel olarak yönetişim kalitesine yönelik olumsuz tutumlara sahip olmak, işlevselliğe yönelik açık tutumları etkileyebilir. Bununla birlikte, örtük düzeyde, sürücüler örtük

tutumların otomatik olarak yansıtılmasından ve çeşitli önyargılardan etkilenmemesine bağlı olarak, trafik iklimini daha işlevsel olarak algılayabilir.

Trafik iklimine yönelik örtük ve açık tutumların sürücü davranışları ile ilişkilerine bakıldığında, sadece işlevselliğe yönelik örtük tutumların hatalar, ortalama hız, hızın standart sapması ve şerit takibinin standart sapması ile negatif korelasyon göstermiştir. Trafiği örtük olarak daha işlevsel olarak algılayan sürücüler, beyana dayalı ölçümlerde daha az sayıda hata rapor etmişlerdir ve simülasyondaki sürücü davranışlarına göre daha düşük hız ve daha az varyans gösterirken, daha az şerit değişimi göstermişlerdir. Literatürde işlevsellik boyutuna yönelik açık tutumlar çoğunlukla ihlallerle ilişki göstermiştir (Chu ve ark., inceleme altında; Gehlert ve ark., 2014). Bununla birlikte, mevcut çalışmanın bulguları, işlevselliğe yönelik örtük tutumların hatalarla ilişkili olduğunu göstermiştir. Hatalar, sürücülerin dikkat yeteneklerini de içeren performans sınırlılıkları ile ilgilidir. Daha işlevsel trafik ortamı, sürücülerin trafiğe daha fazla dikkat etmesine yardımcı olabilir ve bu da hata sayısını azaltabilir.

SDÖ'nün alt faktörleri ile simülatördeki sürücü davranışları arasındaki ilişkiler incelendiğinde, beyana dayalı ihlaller ortalama hız, hızın standart sapması ve şerit takibinin standart sapması ile pozitif ve ortalama şerit takibi ile negatif korelasyon göstermiştir. Önceki bulgulara benzer olarak, objektif olarak ölçülen hız ile ilişkili değişkenler, SDÖ'nun ihlal alt ölçeği ile ilişkili bulunmuştur (Helman ve Reed, 2015). Hız seçimine benzer şekilde şerit takibinin de niyetli bir davranış olabileceği tartışılabilir.

Karşılaştırma Analizleri

Trafik iklimine yönelik örtük ve açık tutumların bulgularını bir arada ele alan cinsiyet temelli yapılan karşılaştırma analizlerinde, sadece işlevselliğe yönelik örtük tutumlar için anlamlı sonuçlar bulunmuştur ve kadın sürücüler trafik iklimini erkek sürücülere göre örtük olarak daha işlevsel bulmuştur. Bu bulgu, belirli bir nesneye yönelik farklı örtük ve açık tutumlara sahip olabileceği fikrini destekleyebilir (Rydell ve McConnell 2006; Wilson, Lindsey ve Schooler, 2000).

Beyana dayalı sürücü davranışlarındaki cinsiyet farklılıklarını araştırmak için yapılan karşılaştırma analizlerinde, sadece pozitif sürücü davranışları için cinsiyet farklılığı bulunmuştur. Erkek sürücüler, kadın sürücülere göre daha fazla pozitif sürücü davranışları raporlamışlardır. Çalışma 1'de, pozitif sürücü davranışlarını gösterebilmenin bir beceri boyutu olarak algılanabileceği öne sürülmüştür. Literatürde, erkek sürücülerin, kadın sürücülerden daha yüksek algısal motor becerilere sahip oldukları görülmüştür (Özkan, Lajunen, Chliaoutakis, Parker ve Summala, 2006; Martinussen, Moller ve Prato, 2014). Ek olarak, hem örtük hem de açık bir şekilde ölçüldüğünde, erkekler kadınlara oranla kendilerini sürüş konusunda daha iyi yorumlamışlardır (Harre ve Sibley, 2007; Sibley ve Harre, 2009). Sürücüler, pozitif davranış sergilemeyi bir beceri boyutu olarak algılıyorsa, erkek sürücülerinin olumlu davranışlar için kendini yüceltme yatkınlığına sahip olmasını beklemek makul olabilir. Bu varsayım gelecekteki araştırmalarda daha fazla araştırmaya ihtiyaç duymaktadır.

Simülatördeki sürücü davranışlarındaki cinsiyet farklılıkları araştırıldığında, erkek sürücüler kadın sürücülerden daha yüksek ortalama hız göstermişlerdir. Literatürde, genç erkek sürücüler, daha yüksek kaza sayılarına ve ihlallere bağlı olarak (Kadına ve Dissanayake, 2014) kadın sürücülere göre daha riskli sayılmaktadır (Hassan ve Abdel-Aty, 2013; Laapotti ve Keskinen, 2004; Laapotti, Keskinen, Hatakka ve Katila, 2001). Şerit takibindeki cinsiyet farklılığına göre, erkek sürücüler kadın sürücülere göre orta çizgiye daha da yaklaşmış ve hatta daha fazlasını geçmiştir.

Regresyon Analizleri

Trafik iklimine yönelik açık tutumlar ve beyana dayalı sürücü davranışları arasında ilişki bulunamamıştır. Trafik iklimine yönelik örtük tutumlar ile beyana dayalı sürücü davranışları arasındaki ilişkiler incelendiğinde, işlevselliğe yönelik örtük tutumlar, pozitif sürücü davranışları ile pozitif ilişki göstermiştir. Trafik iklimi örtük olarak daha fazla işlevsel algılandıkça, daha fazla olumlu sürücü davranışı sergilenmektedir. İşlevselliğe ve içsel gereksinimlere yönelik örtük tutumlar arasında da pozitif bir ilişki bulunmuştur. İçsel gereklilikler, trafik bağlamında

gerekli olan beceri ve yeteneklerle ilgilidir. Dolayısıyla, pozitif ilişkilere dayanarak, pozitif davranışlar göstermenin beceri boyutu olarak algılanabileceği düşünülebilir. Çalışmanın ilk bölümündeki bulgular, pozitif sürücü davranışlarının bir beceri boyutu olarak da algılanabileceğini ortaya koymuştur.

Trafik iklimine yönelik açık tutumlar ve simülatördeki sürücü davranışları arasında bir ilişki bulunamamıştır. Trafik iklimine yönelik örtük tutumlar ve simülatördeki sürücü davranışları arasındaki ilişkiler incelendiğinde, işlevsellik boyutuna yönelik örtük tutumlar, şerit takibinin standart sapması ile negatif yönde ilişkili bulunmuştur. Sürücüler trafik iklimini örtük olarak işlevsel algıladıklarında, şerit takibinde daha az varyans göstermişlerdir.

Kısıtlılıklar ve İleriki Çalışmalar için Öneriler

Trafik iklimi ile sürücü davranışları arasındaki ilişki, genç sürücü örnekleminde ilk defa bu çalışma kapsamında incelenmiştir. Sonuçlar, genç sürücülerin trafik iklimine karşı tutum oluşturmak için daha fazla deneyime ihtiyaç duyduğunu göstermektedir. Bu nedenle, gelecekteki çalışmalara, karşılaştırma yapmak için genç profesyonel sürücüler ve farklı yaş gruplarından sürücüler de dahil edilebilir.

Mevcut çalışmaya sadece 78 sürücü katılmıştır. Gelecekteki çalışmalarda, analizde olası problemleri önlemek için örneklem büyüklüğü genişletilebilir ve farklı yol kullanıcı grupları dahil edilebilir.

Genel Tartışma

Çalışma 1'de, trafik iklimine yönelik açık tutumlar ile beyana dayalı sürücü davranışları arasındaki ilişkiler kültürlerarası olarak hem Çin'de hem de Türkiye'de incelenmiştir. Çalışma 2'de, trafik iklimine yönelik hem örtük hem de açık tutumların sürücü davranışları ile ilişkileri genç sürücü örnekleminde incelenmiştir. Ayrıca, bu çalışmada ilk defa trafik iklimi için örtük ölçüm testi geliştirilmiştir.

Türk ve Çin örneklemleri için TİÖ'nin bazı maddelerinin farklı faktörlere yüklendiğini ve bu maddelerin ağırlıklı olarak trafik bağlamında yaşanabilecek

olumsuz duygularla ilgili olduğunu görülmüştür. Türk örnekleminde içsel gereksinimler faktörüne yüklenen bu maddeler; Çin örnekleminde dışsal duygu talepleri faktörüne yüklenmişlerdir. Bu örüntü, Türkiye'deki sürücülerin bu duyguları, başa çıkma becerileri gerektiren duygular olarak algıladığını gösterebilir. Bu fark, Türkiye ile Çin arasındaki kültürel farklılıklar ile açıklanabilir. Çin, hakimiyet değerinde Türkiye'den daha yüksek bir puana sahiptir. Yüksek hakimiyet seviyesindeki toplumlarda, insanlar doğal ve sosyal çevrenin manipülasyonuna daha fazla önem verirler. Çin'deki sürücüler sosyal çevreyi manipüle etmeye çalıştıkları için, trafik ortamında yaşadıkları etkiyi dışsallaştırabilirler. Türkiye ile Çin arasındaki kültürel farklılık, uyumluluk değeri ile ilgilidir. Türkiye, Çin'e göre daha uyumlu bir kültür olarak kabul edilmektedir (Schwartz, 2006). Dolayısıyla, Türkiye'deki sürücüler, trafik bağlamında karşılaştıkları olumsuz duyguların bir kısmını içselleştirmiş olabilirler ve bu duyguları başa çıkmaları gereken duygular olarak algılıyor olabilirler.

Çalışma 1'deki Türkiye örneklemi her yaştan ve farklı deneyim seviyelerindeki sürücülerden oluşurken, çalışma 2'deki örneklem sadece genç sürücülerden oluşmaktadır. İki grup arasında, TİÖ'de farklı faktörlere yüklenen on madde bulunmaktadır. Çalışma 1'in örnekleminde bu maddeler içsel gereksinimler olarak, genç sürücüler arasında ise işlevsellik olarak algılanma eğilimindedir. Bu farklılığın nedeni örneklemler arasındaki demografik farklılıklar olabilir. Yapılan üç analizde de aynı faktörlere yüklenen maddeler, her faktörün kendi çekirdek öğelerine sahip olduğunu göstermektedir. Bu temel maddeler ile TİÖ'nün kısa bir versiyonu geliştirilebilir.

Trafik iklimi ile sürücü davranışları arasındaki ilişkiler de kültürler, yaş grupları ve ölçüm yöntemleri arasındaki benzerlikler ve farklılıklar göstermiştir. Dışsal duygu talepleri hem Türkiye hem de Çin'de ihlaller, hatalar ve pozitif sürücü davranışlarıyla negatif yönde ilişkilidir ve bu bulgu daha yüksek dışsal duygu taleplerin trafik güvenliğini olumsuz etkileyebileceğini göstermektedir. Bütün sürücü davranışları ile ilişkili olan tek boyut olduğu için, insan faktörünü de içerecek

yeni stratejilerde, dışsal duygu taleplerine daha fazla odaklanmak stratejilerin daha etkin olmasını sağlayabilir.

İki kültür arasındaki farklılıklarda, Türkiye'de işlevsellik ihlallerle ile negatif yönde ilişki göstermiştir. Türkiye örnekleminin, Çin örnekleminden daha genç olması, iki örneklem arasındaki farklılığın nedeni olabilir. Çin'de içsel gereksinimler ihlaller ile negatif yönde ilişki göstermiştir. Genç yaş ve daha yüksek kilometrenin ihlaller ile ilişkili olduğu göz önünde bulundurulursa (de Winter ve Dodou, 2010), Türkiye'deki yüksek ihlaller, trafik bağlamında algılanan gerekli becerilerden ziyade, demografik özelliklere bağlı olabilir. Türkiye'de karayolu güvenliği girişimleri için işlevsellik, Çin'e kıyasla odaklanılması gereken önemli bir değişken iken Çin'de içsel gereksinimlere odaklanmak daha önemli olabilir.

Trafik ikliminin alt faktörleri arasındaki ilişkilerin yönleri Türkiye ve Çin örneklemlerinde farklılıklar göstermektedir. Türkiye'de sürücüler trafik iklimini daha az işlevsel olarak algıladıkça, daha yüksek beceriler gerektirdiğini düşünüyorlar. Bununla birlikte, Çin'de trafik iklimi daha işlevsel olarak algılandıkça, daha fazla beceri olarak algılıyorlar. Bu bulgular, Türkiye ile Çin arasındaki TİÖ faktörlerinin karşılaştırmaları ile birlikte değerlendirildiğinde, Türkiye'deki sürücülerin trafik bağlamlarını daha az işlevsel ve Çin'deki sürücülerden daha çok beceri gerektiren olarak algıladıkları görülmektedir. Türkiye örnekleminde, sürüş ile ilgili kendini yüksek görme yanlılığı daha fazla olabilir ve bu farklılığa neden olabilir. Türkiye bağlamında, sürücüler, trafik sisteminin işlevselliğinden ziyade, pozitif trafik ikliminin nedenlerini bir sürücü olarak usta olmalarına bağlayabilirler.

Çalışma 1'in bulguları, trafik iklimi ve sürücü davranışlarının ilişkili olduğunu göstermesine rağmen, Çalışma 2'nin sonuçları bu bulguları desteklememiştir. İki örneklemin demografik değişkenlerindeki farklılıklar tutarsız sonuçların altında yatan neden olabilir. Genç sürücülerin trafik ortamına yönelik tutumları, trafikteki düşük deneyimleri nedeniyle henüz gelişmemiş ya da tutarlı hale gelmemiş olabilir. Deneyimin trafik iklimine yönelik tutumların oluşmasındaki olası rolünün

incelenmesi için, daha yüksek deneyime sahip genç profesyonel sürücüler çalışmalara dahil edilebilir.

Literatürde, ilk kez trafik iklimi için bir örtük ölçüm geliştirilmiştir. Sonuçlar arasında genç sürücülerin işlevselliğe yönelik örtük tutumlar geliştirebildiği söylenebilir. Genç sürücüler, trafik iklimini örtük olarak daha işlevsel algıladıkça, daha fazla pozitif sürücü davranışları rapor etmişler ve şerit takibinde daha az varyans göstermişlerdir. Düşük varyans daha az şerit değiştirmeyi yansıtabilir, bu da karayolu trafiği güvenliği için daha güvenli olabilir. Dışsal duygu taleplerine ve içsel gereksinimlere kıyasla, işlevsellik boyutu daha somuttur, çünkü işlevsellik boyutu trafik sistemi için güvenlik ve hareketlilik özellikleri hakkındadır. Bu nedenle, genç sürücülerdeki yol güvenliğini artırmak için, müdahaleler işlevsellik üzerinde odaklanabilir.

Trafik karmaşık bir sistemdir ve çoğunlukla anlık kararlar içerir. Örtük tutumlar ise ani kararlar vermek için daha önemlidir (Perugini, 2005; Rydell & McConnell, 2006). Karayolu güvenliğini arttırmak için, örtük tutumları değiştirmeyi amaçlayan müdahaleler daha etkili olabilir. Örtük tutumlar, açık tutumlarla kıyasla, fazla miktarda karşı-tutum bilgisini kullanarak ve yavaşça değişmektedir (Rydell ve McConnell, 2006). Örtük tutum değişikliği uzun zaman gerektirdiğinden, sürücü okullarının programlarına sistematik müdahaleler şeklinde dahil edilebilirler.

Çalışma 1'in sonuçları, trafik iklimi ve sürücü davranışları arasındaki ilişkilerin hem kültürler arası benzerlikleri hem de farklılıkları barındırdığını göstermektedir. Çalışma 2'nin sonuçları, insanların trafik ikliminin işlevselliği ile ilgili olan trafik iklimine karşı farklı örtük ve açık tutumlar sergileyebildiklerini göstermektedir. Türkiye örneklemindeki bulgular karşılaştırıldığında, genç sürücülerin trafik iklimine yönelik açık ve örtük tutumlarını geliştirmek için daha fazla deneyime ihtiyaç duyabileceği varsayılabilir.

Uygulamalar

Türkiye'deki sürücüler trafik iklimini daha fazla içsel gereksinimli algıladıkça, daha az fonksiyonel algılamışlardır. Çin'deki sürücüler ise trafik iklimini daha fazla içsel

gereksinimli algıladıkça, daha fazla fonksiyonel algılamışlardır. İçsel gereksinimler trafik ortamında gerekli beceriler ile ilişkilidir. İşlevsellik ise trafik ortamındaki kurallar ve yaptırımlar, hareketlilik ve güvenlik ile ilgilidir (Gehlert et al., 2014). Türkiye'de sürücüler olumlu pozitif iklimini trafik sistemine atfetmektense, kişisel becerilerle ilişkilendirmeye yatkın olabilirler. Çin'de ise işlevsellik ve becerinin el ele ilerlediği görülmektedir. Çalışma 2'de trafik iklimine yönelik örtük tutumlar, Türkiye'deki sürücülerin trafik iklimini daha fazla beceri gerektiren algılarken, daha fazla işlevsel algıladığını göstermiştir. Bir diğer değişle, Türkiyede'ki sürücülerin trafik iklimine yönelik örtük ve açık tutumların farklılaştığı söylenebilir. Sonuçlar birlikte ele alındığında, Türkiye'deki sürücülerin kendi becerilerine yönelik atıflarda bulunup, kendi becerilerini gerçekte olan becerilerinden daha yüksek algılamaya yatkın oldukları söylenebilir. Bu yanlılık, trafik güvenliği için olumsuz sonuçlara neden olabilir. Ön hazırlama tekniklerinin sistematik kullanımı ile sürücülerin kendi becerilerine yönelik tutumlarını değiştirmek trafik güvenliğini arttırmak için önemli bir adım olabilir.

Genç sürücülerin ihlallere ve hız yapmaya daha yatkın oldukları, hem bu çalışmada hem de daha önceki çalışmalarda bulgulanmıştır. Trafikte "stajyer sürücü" sisteminin kullanılması, trafik güvenliğinin arttırılması konusunda kritik bir role sahip olabilir. Fakat, bir sürücü "stajyer sürücülük" süresi boyunca trafikte aktif olmayabilir. Bu grup sürücüler, sürelerinin dolmasıyla beraber hiç ceza puanları olmadığı için başarılı sürücü olarak nitelendirilecekler. Bir stajyer sürücünün bu süreci başarılı ile tamamlarken gerçekten trafikte başarılı olarak mı tamamladığını ya da sürücülük yapmayarak mı bu süreyi tamamladığını belirlemek için izleme sistemlerinin geliştirilmesi gerçek bir gerekliliktir. Sonuç olarak, etkin ve etkili bir stajyer sürücü dönemi, genç sürücüler arasında ihlal ve kazaları azaltmakta önemli role sahip olacaktır.

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Research Assistant: Middle East Technical University (2011 – 2018)

SECONDMENTS

Visiting Scholar: Kosovo Association of Motorization "AMRKS", Tempulli College (21 January 2018 – 10 January 2018) (MSCA-RISE-2014-TraSaCu project)

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Visiting Scholar: Center for Health and Safety Culture, Montana State University, United States (01 September 2016 – 21 November 2016) (MSCA-RISE-2014-TraSaCu project)

PUBLICATIONS

Tekeş, B., **Üzümcüoğlu, Y.,** Hoe, C., & Özkan, T. (2018). The relationship between Hofstede's cultural dimensions, Schwartz's cultural values and obesity. *Psychological Reports* (DOI: 10.1177/0033294118777965).

Üzümcüoğlu, Y., Özkan, T., Lajunen, T., Morandi, A., Orsi, C., Papadakaki, M., & Chliaoutakis, J. (2016). Life quality and rehabilitation after a road traffic crash: A literature review. *Transportation Research Part F: Traffic Psychology and Behaviour*, *40*, 1-13. (DOI: 10.1016/j.trf.2016.02.002)

Solmazer, G., **Üzümcüoğlu, Y.,** & Özkan, T. (2016). The role of traffic law enforcements in the relationship between cultural variables and traffic fatality rates across some countries of the world. *Transportation Research Part F: Traffic Psychology and Behaviour*, *38*, 137-150. (DOI: 10.1016/j.trf.2016.01.001)

Hoe, C., Rodriguez, D. C., **Üzümcüoğlu, Y.,** & Hyder, A. A. (2016). "Quitting like a Turk": How political priority developed for tobacco control in Turkey. *Social Science & Medicine*, *165*, 36-45. (DOI:10.1016/j.socscimed.2016.07.027)

CONFERENCES AND CONGRESS

Oral Presentations – International

Üzümcüoğlu, Y., Lajunen, T., Öz, B., & Özkan, T. "What about Driver Instructors' Accidents, Driver Behaviors, and Attitudes?" 14th European Congress of Psychology, Milan-Italy, 2015.

Üzümcüoğlu, Y., & Bilgiç, R. "The Mediating Role of Work to Family Conflict, Job Satisfaction and Affective Commitment in The Relationship between Work Stressors and Turnover Intentions" 28th International Congress of Applied Psychology, Paris-France, 2014.

Oral Presentations – National

Özkan T., Öz, B., Demir, B., Bıçaksız, P., & **Üzümcüoğlu, Y**. "Trafik Psikolojisi" Yıldırım Beyazıt Üniversitesi Psikoloji Kongresi, Ankara-Türkiye, 2018.

Bıçaksız, P., **Üzümcüoğlu, Y.,** & Öztürk, İ. "ODTÜ Psikoloji Bölümü Güvenlik Araştırma Birimi: Türkiye'de Trafik Psikolojisi Uygulamaları" Yıldırım Beyazıt Üniversitesi Psikoloji Kongresi, Ankara-Türkiye, 2016.

Poster Presentations – International

Hoe, C., Weiger, C., **Üzümcüoğlu, Y.,** & Cohen, J. "The Politics of Tobacco Control Policy Adoption: Lessons from India and Turkey" Society for Research on Nicotine & Tobacco Annual Meeting, Baltimore-USA, 2018.

Hoe, C., **Üzümcüoğlu, Y.,** & Hyder, A. "Why Political Priority Did Not Emerge For Road Safety in Turkey: A Policy Analysis" 12th World Conference on Injury Prevention and Safety Promotion, Tampere-Finland, 2016. (DOI: 10.1136/injuryprev-2016-042156.505)

Tekeş, B., & **Üzümcüoğlu, Y.** "Hofstede's Cultural Dimensions and Obesity" 14th Europen Congress of Psychology, Milan-Italy, 2015.

Üzümcüoğlu, Y., & Bilgiç, R. "What Motivates Blue Collars to Work in Turkey?" 13th European Congress of Psychology, Stockholm-Sweden, 2013.

Poster Presentations – National

Üzümcüoğlu, Y., & Bilgiç, R. "Mavi Yakalar için Motivasyon Ölçeğinin Geliştirilmesi" 18. Ulusal Psikoloji Kongresi, Uludağ Üniversitesi, Bursa-Türkiye, 2014.

PROJECTS

Scholar & Researcher: Traffic Safety Cultures and Safe Systems Approach – Towards a Cultural Change Research and Innovation Agenda for Road Safety (TraSaCu) (2015-2018). Project funded by the EU Framework Programme Horizon 2020 - Marie Skłodowska-Curie grant agreement, Project No: 645690.

Researcher: Global Road Safety in 10 Countries Project (RS10) (2010-2015). Johns Hopkins International Injury Research Unit Project funded by Bloomberg Philanthropies.

SCIENTIFIC MEETING ORGANIZATIONS

Head of Organization Committee - 27th Congress of European Federation of Psychology Students' Associations (21-28 April 2013), Özdere-Turkey

Member of Host Team – European Summer School 2016, Özdere – Turkey

Co-head of Organization Committee – Annual Meeting of Executive Board and Member Representatives of EFPSA, November 2009, Anamur

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Peer-review activities in journals

Transportation Research Part F: Traffic Psychology and Behaviour,
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EXPERT REPORTS

Özkan, T. & **Üzümcüoğlu, Y.,** et al., (2017). Türkiye Analizi: Takip Çalışması 2016 Sürücü ve Ön Koltuk Yolcularının Emniyet Kemeri Kullanımı, 1-289. http://www.trafik.gov.tr/SiteAssets/Yayinlar/Kitaplar/Emniyet_Kemeri_2016.pdf

Özkan, T. & **Üzümcüoğlu, Y**., et al., (2015). Türkiye Analizi: Takip Çalışması 2015 Sürücü ve Ön Koltuk Yolcularının Emniyet Kemeri Kullanımı, 1-294. http://www.trafik.gov.tr/SiteAssets/Yayinlar/Kitaplar/Emniyet_Kemeri_2015.pdf

Özkan, T., Öztürk, İ., & **Üzümcüoğlu, Y.,** et al., (2015). Trafik Kurul Kararlarının Analizi – Türkiye Değerlendirmesi, 1-89. http://www.trafik.gov.tr/SiteAssets/Yayinlar/Bildiriler/pdf/Trafik%20Kurul%20Kararlarının%20Analizi%20Türkiye%20Taslak%20Raporu%202.pdf

Özkan, T. & **Üzümcüoğlu, Y.,** et al., (2014). Türkiye Analizi: Sürücü ve Ön Koltuk Yolcularının Emniyet Kemeri Kullanımı, 1-187. http://www.trafik.gov.tr/SiteAssets/Yayinlar/Kitaplar/Emniyet%20Kemeri%20Nihai%20Rapor.pdf

EU PROJECT REPORTS

Azık., D., Ersan, Ö., Findik, G., Kaçan, B., Solmazer, G., **Üzümcüoğlu. Y.,** Danelli-Mylona, Delli, G., Dhrami, K., Georgogianni, D., Janku, E., Krasniqi, E. B., Krasniqi, M., Lajunen, T. Makris, E., Öz, B., Özkan, T., Pashkevich, A., Pashkevich, M., Salamon, B., Shubenkova, K. van Strijp-Houtenbos, M., Volynets, A., Xheladinic,G. (2018). Model of traffic cultures and impact (Deliverable 4.1) for Traffic Safety Cultures and the Safe Systems Approach Towards a Cultural Change Research and Innovation Agenda for Road Safety (TraSaCu) Project, 1-228.

Azık., D., Ersan, Ö., Fındık, G., Kaçan, B., Özkan, T., Solmazer, G., **Üzümcüoğlu. Y.,** Pashkevich, A., Pashkevich, M., Danelli-Mylona, Delli, G., Dhrami, K., Georgogianni, D., Janku, E., Krasniqi, E. B., Krasniqi, M., Lajunen, T. Makris, E., Öz, B., Salamon, B., Shubenkova, K. van Strijp-Houtenbos, M., Volynets, A., Xheladinic,G. (2018). Draft of Change - Management Strategy (Deliverable 4.2) for Traffic Safety Cultures and the Safe Systems Approach Towards a Cultural Change Research and Innovation Agenda for Road Safety (TraSaCu) Project

Ersan, Ö., Findik, G., Furian, G., Georgogianni, D., Kaiser, S., Lajunen, T., Makris, V., Pashkevich, A., Solmazer, G., **Üzümcüoğlu, Y.,** & Vlk, T. (2017). Traffic Safety Culture in Practice Commitment and Compliance (Deliverable 3.1) for Traffic Safety Cultures and the Safe Systems Approach Towards a Cultural Change Research and Innovation Agenda for Road Safety (TraSaCu) Project, 1-132.

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THE RELATIONSHIP BETWEEN TRAFFIC CLIMATE AND DRIVER BEHAVIORS: EXPLICIT AND IMPLICIT MEASURES WITH TURKISH AND CHINESE SAMPLES

TEZİN TÜRÜ / DEGREE: **Yüksek Lisans** / Master ☐ **Doktora** / PhD ■

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