# THE DIFFERENTIAL ASSOCIATIONS OF FUNCTIONAL AND DYSFUNCTIONAL IMPULSIVITY WITH DRIVER BEHAVIORS AND SKILLS, ACCIDENTS AND OFFENCES

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## ABSTRACT

THE DIFFERENTIAL ASSOCIATIONS OF FUNCTIONAL AND DYSFUNCTIONAL IMPULSIVITY WITH DRIVER BEHAVIORS AND SKILLS, ACCIDENTS AND OFFENCES

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The aim of the present thesis was first to systematically review the literature on the association between impulsivity and driving related outcomes. Based on the results of this systematic review, another aim was to integrate the "functional impulsivity" conceptualization in the general contextual mediated model to explain accidents and offences; and develop a scale to measure "driving specific impulsivity" including both the functional and dysfunctional conceptualizations of impulsivity. First, a qualitative study was conducted to develop the driving specific impulsivity scale. Two scales to measure driving specific impulsive behavior and driving specific impulsive personality were developed. Then a quantitative study was conducted to validate the newly developed scales, to compare the explanatory power of the newly developed scales with the widely used general impulsivity scales in the literature, and

to test the associations proposed in the integrative conceptual framework for driving style/behavior and performance/skills. The results yielded support for the expectations in general. In addition, the comparisons of the explained variance portions by driving specific impulsivity measures and by general impulsivity scales proved that driving specific impulsivity explains greater amount of variance in driver behaviors and skills than general impulsivity. Therefore, it is evidenced that studying driving specific impulsivity to understand and explain driver behaviors, driving skills, accidents and offences is a promising area that deserves further research attention.

**Keywords:** Impulsivity, Driver Impulsivity, Driver Behaviors, Driver Skills

# ÖZ

İŞLEVSEL VE İŞLEVSİZ DÜRTÜSELLİĞİN SÜRÜCÜ DAVRANIŞLARI VE BECERİLERİ, KAZALAR VE CEZALARLA FARKLILIK GÖSTEREN İLİŞKİLERİ

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Bu tezin amacı ilk olarak dürtüsellik kişilik özelliği ve sürücülükle ilgili değişkenler arasındaki ilişkiyi inceleyen çalışmaların bir sistematik literatür taramasını yapmaktır. Bu sistematik literatür taraması sonucunda ortaya çıkan diğer bir amaç ise "işlevsel dürtüsellik" kavramının kaza ve ceza sayılarını açıklamada kullanılan genel bağlamsal aracı değişkenli modele entegre edilmesi; ve hem işlevsel hem de işlevsiz dürtüsellik kavramlarını içerecek bir "sürücülük bağlamına özel dürtüsellik" ölçeği geliştirmektir. İlk olarak sürücülük bağlamına özel dürtüsellik ölçeği geliştirmek amacıyla nitel bir çalışma yapılmıştır. Bu çalışmanın sonucunda sürücülük bağlamına özel dürtüsel davranış ve dürtüsel kişilik ölçekleri geliştirilmiştir. Ardından, geliştirilen ölçüm araçlarının geçerliğini sınamak, bu yeni geliştirilen ölçeklerle literatürde hali hazırda kullanılan genel dürtüsellik ölçeklerinin açıklayıcı

güçlerini karşılaştırmak, ve sürücü stil/davranış ve beceri/performansını açıklamak üzere öne sürülen birleştirici bağlamsal modeldeki ilişkileri test etmektir. Genel olarak sonuçlar beklentileri destekler niteliktedir. Ayrıca, sürücü bağlamına özel dürtüsellik ve genel dürtüsellik ölçeklerinin açıkladıkları varyans oranları karşılaştırmaları sonucunda sürücülük bağlamına özel dürtüsellik ölçeklerinin sürücü davranış ve becerilerinde daha büyük oranda varyans açıkladığı görülmüştür. Bu nedenle, sürücülük bağlamına özel dürtüselliğin sürücü davranışları ve becerileri, kazalar ve cezaları daha iyi anlamak ve açıklamak için yürütülecek çalışmalarda ele alınmasının verimli bir araştırma alanı olma yolunda olduğu görülmüştür.

**Anahtar Kelimeler:** Dürtüsellik, Sürücü Dürtüselliği, Sürücü Davranışları, Sürücü Becerileri

*To my parents  Necla & Ramazan Bıçaksız*

*and*

*my grandmother Gülter Ergezer*

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# CHAPTER 1

# 1. LITERATURE REVIEW

The present literature review investigated the relationship between impulsivity and driver behaviors, offences and road traffic accidents through the lenses of characterological perspective. The studies published from 1970 to 2014 that examined and reported a relationship between impulsivity and at least one driving related outcome.(e.g., a self-report measure of driver behavior) were included. The relevant 38 out of 288 studies are presented in four sections based on the driving related outcomes as; i) aberrant driver behaviors and driving anger/aggression, ii) driving under the influence, iii) traffic offences and accidents , iv) other. The vast majority of the studies reported significant relationships between impulsivity and the driving outcomes. The general findings of the studies in the literature, suggestions including a new definition of impulsivity in driving context, and future directions are discussed in the scope of a proposed integrative conceptual framework.

## 1.1. Introduction

### 1.1.1. Definition of Impulsivity

Impulsivity is probably one of the most important constructs in almost all models of personality (Whiteside & Lynam, 2001). There is a high volume of research on this construct.There still remains, however, a disagreement about the definition of impulsivity (Evenden, 1999). It can still be, one the one hand, broadly defined as the "tendency to act with little forethought , without deliberation and evaluation of consequences"(Caci, Nadalet, Baylé, Robert & Boyer, 2003, p. 34). There are also different conceptualizations regarding the components and factor structure of the construct, i.e. whether it has one dimension or it is made up of many different traits or behavioral patterns (Evenden, 1999). For example, a wide variety of "seemingly

unrelated" maladaptive behaviors such as inability to wait, difficulty in witholding responses and an insensitivity to negative or delayed responses have been termed as "impulsivity" (de Wit, 2009). Behavioral inhibition and impaired decision making have been most commonly identified processes underlying impulsivity (de Wit, 2009). In the most general terms, on the other hand, impulsivity is defined as the inability to delay gratification or the inverse of self-control (Monterosso & Ainslie, 1999). It seems that different definitions of impulsivity are the reflections of different theoretical perspectives of impulsivity to some extent.

### 1.1.2. Three Theorethical Perspectives

It can be claimed that impulsivity has been studied in the realm of three different perspectives; cognitive, behavioral and characterological (Arce & Santisteban, 2006). From the cognitive perspective, impulsivity is defined as the inability to consider the consequences of immediate and future events and therefore, delay gratification. Behavioral (or motor) impulsivity is mostly related to response inhibition and measured by experimental tasks such as the go/no-go and stop tasks. The third one, characterological perspective to investigate impulsivity, which is also the focus of the present paper, is mostly measured by self-report instruments based on different personality models.

#### *1.1.2.1.Characterological Perspective*

One of the earliest conceptualizations of impulsivity is Buss and Plomin's (1975) "lack of inhibitory control", involving three dimensions; decision time, which is the tendency to consider alternatives and consequences before making a decision; persistence, that is the ability to continue a task by resisting competing temptations; and sensation seeking, which is the tendency to become bored and need to seek novel stimuli. Another model involving impulsivity as a personality variable is Eysenck's biological model (Eysenck & Eysenck, 1985) in which impulsivity is hypothesized to be a combination of narrow impulsivity, nonplanning, liveliness and risk taking. Based on Eysenck's theory, other biological theories of personality, namely Gray's (1987), Cloninger's (1987), and Zuckerman's (1984) models were developed (Acton, 2003; Arce & Santisteban, 2006).

In Gray's neuropsychologically based model, impulsivity is based on an apetitive behavioral approach system which is closely related to Eysenck's extraversion (Acton, 2003). In an attempt to explain the pathways leading to impulsive responding based on Gray's model, Newman and his collegues suggested three distinct pathways leading to impulsivity.The first one, normal impulsivity, results in overresponsivity to rewards based on dominance of the behavioral approach system over the behavioral inhibition system. The second one is characterized as anxious impulsivity, stemming from a dominance of the behavioral inhibition system. The third pathway is named as the deficient P(psychopathic)-constraint involving the difficulty to incorporate feedback from the environment and utilize the information coming from the environment to modify his/her responses in the process of reward seeking (Newman & Wallace, 1993; Wallace, Newman & Bachorowski, 1991).

In Cloninger's three dimensional model of personality, there are three genetically independent dimensions of personality, namely harm avoidance, reward dependence, and novelty seeking. Various traits are made up of the different combinations of these dimensions and impulsivity is characterized as high novelty seeking combined with relatively low reward dependence and low harm avoidance.

Finally, Zuckerman and colleagues (Zuckerman, Kuhlman & Camac, 1988) included impulsivity in a general framework of personality. Based on the factor analyses on items from many different scales measuring sensation seeking and impulsivity, they developed the five factor Zuckerman–Kuhlman Personality Questionnaire (ZKPQ-IIIR). Impulsive-sensation seeking (ImpSS) is one of these five factors, and it involves a tendency to act without thinking and a lack of planning. The items loading on this factor are tapping on the willingness to take risks for the sake of excitement or novel experience.

*1.1.2.2. "An Integrative Perspective"*

In a way, integrating the above mentioned three approaches in impulsivity research, namely behavioral, cognitive and characterological approaches, Barratt and colleagues (Barratt, 1993; Gerbing, Ahadi & Patton, 1987; Patton, Stanford &Barratt, 1995; Stanford & Barratt, 1992) incorporated findings from research utilizing

different measures such as self-report inventories, cognitive and behavioral tasks, and brain-behavior research with animals. Barratt and colleagues developed the Barratt Impulsiveness Scale (BIS) especially to differentiate impulsiveness from anxiety. Later, it has been clarified that the versions of the scale represents a three-component structure of impulsivity comprising of motor impulsiveness defined as acting without thinking; cognitive/attentional impulsiveness involving difficulty in focusing on the task at hand and making quick cognitive decisions; and non-planning, representing a present orientation or lack of future orientation (Patton, Stanford &Barratt, 1995).

### 1.1.3. Is Impulsivity Only Dysfunctional?

In the conceptualizations of impulsivity listed above, it should be noted that, there is a common negative or maladaptive connotation in all. Dickman (1990) suggested that impulsivity may be differentiated as functional and dysfunctional. He investigated whether or not the factors causing people to respond quickly and inaccurately when this leads to some kind of difficulty are the same as those causing them to respond quickly and inaccurately when this is the optimal way of responding, that is, having positive consequences. He reasoned that if impulsive behavior was that pathological, it would not remained intact through our evolutionary history and that not all impulsive behavior is disadvantageous. He also argued that there may be two distinct traits associated with quick and inaccurate performance, one taking place when this is optimal and the other taking place when this is nonoptimal. He conceptualized the former as functional impulsivity and the latter as dysfunctional impulsivity.

Dickman (1990) developed a scale consisting of items written to tap functional and dysfunctional impulsivity and the factor analysis showed a clear picture of the differentiation of the two separate components of impulsivity, with a correlation of .07 between them. In addition, he investigated whether these two distinct constructs relates differentially to other traits that have been known to be associated with impulsivity and concluded that the two types of impulsivity have different patterns of correlations with other personality traits. For instance, it was

found that enthusiasm, adventurousness and activity were more strongly related to functional impulsivity than dysfunctional impulsivity, while disorderliness and the tendency to ignore hard facts when making decisions were found to be more strongly associated with dysfunctional impulsivity than functional impulsivity.

### 1.1.4. Aim of the Present Literature Review

Impulsivity is one of the most widely used constructs in psychology to explain especially maladaptive behavior (de Wit, 2009). Driving is probably one of the most widely studied contexts where impulsivity and/or impulsiveness can be expressed and/or experienced because of its self-paced nature (i.e., a driver usually decides himself/herself how to act and/or behave in traffic). The aim of the present review is, thus, to review the studies in the literature investigating the relationship between impulsivity as an individual difference variable and risky driver behavior and road traffic accidents. In addition, it is argued that despite the presence of a bunch of studies examining the relationship between impulsivity and risky driving behaviors, impulsivity is measured in many different ways (Pearson, Murphy & Doane, 2013). Hence, one of the aims of the current study is to present which measures of impulsivity, therefore, which conceptualization of this construct in the realm of the characterological view, has been mostly used in the studies examining its relations with risky driving.

## 1.2. Method

The literature including the studies involving the relationship between impulsivity and driver behavior was examined. Scopus database (www.scopus.com) was searched by using the word pairs of impulsivity-driver, impulsiveness-driver, impulsivity-driving, impulsiveness-driving, impulsivity-traffic, impulsiveness-traffic, impulsivity-accident, impulsiveness-accident. These word pairs were searched by using the “title, abstract, keyword” alternative; setting the duration as “all years” to “present”; selecting the document type as “all”; and in all subject areas (namely life sciences, health sciences, physical sciences and social sciences) to keep the scope of the search as wide as possible. The only filter variable was language, the search with the above listed criteria was conducted among the publications written in only English language. This search resulted in a total of 288 articles, all of which were

individually screened in terms of the eligibility criteria for inclusion in this review. The studies which (i) used impulsivity as an individual difference variable (i.e., not a state variable induced by some substance or other experimental manipulation), (ii) used a driving related measure (e.g., traffic offence history, a self-report measure of driver behavior, driver behavior measured on a simulated driving task etc.), (iii) examined and reported a relationship between impulsivity and at least one driving related outcome , and (iv) used an adult nonpatient sample (i.e., studies with alcohol dependent patients, attention deficit hyperactivity disorder (ADHD) patients, or individuals with other psychiatric diagnosis were excluded) were included in the review. Thirty eight publications meeting the inclusion criteria that we could reach the full-texts will be presented and evaluated. There were only five publications in the Scopus database that we could reach neither abstracts nor full-texts. Hence, these articles may or may not meet the eligibility criteria for inclusion in this review.

## 1.3. Results of the Literature Review

### 1.3.1. The general structure of the present literature review

The scales used to measure impulsivity in the studies in the present review are presented in Table 1.1, along with the definitions of these dimensions or sample items when available. The results of the review is presented in Table 1.2. For the ease of presentation, results will be presented in four main sections. In the first one, results of the studies investigating the relationship of impulsivity with aberrant driving behaviors and driving anger by using self-report inventories will be presented. In the second section, studies examining the relationship of impulsivity with driving under the influence of alcohol (and cannabis) will be presented. After that, studies involving actual offences (other than driving under the influence) and crash history will be presented. Finally, studies investigating other measures of risky driving in relation to impulsivity will be presented. It should be noted here that there are studies in which more than one driving related outcome variable were examined in relation to impulsivity, therefore the same study may be presented in more than one section.

#### 1.3.1.1. The definitions and measures of impulsivity

As presented in Table 1.1, the definitions and measures of impulsivity across different scales and perspectives were given. These definitions and measures will help readers to clarify the concepts and establish links between impulsivity and driving outcomes in the following sections.

**Table 1.1. Contents of the instruments to measure impulsivity used in the studies reviewed**

| Instrument | Dimensions | Definition/Sample Items |
|---|---|---|
| Barratt Impulsiveness Scale (BIS; Patton et al., 1995) | Motor | Acting on the spur of the moment and lack of perseverance (i.e., a consistent life style) |
| | Cognitive/Attentional | The inability to focus on the tasks at hand and cognitive instability involving thought insertions and racing thoughts |
| | Nonplanning | Lack of self-control (i.e., planning and thinking carefully) and lack of cognitive complexity (i.e., enjoying challenging mental tasks) |
| Urgency Premeditation Perseverance Sensation Seeking Impulsive Behavior Scale (UPPS; Whiteside & Lynam, 2001) | (Negative) Urgency | Tendency to act impulsiveley when experiencing negative affect |
| | Premeditation | Tendency to actively think and plan prior to action |
| | Perseverance | Tendency to persist on tasks until completion |
| | Sensation Seeking | Global tendency to seek excitement |
| UPPS-P (Cyders et al., 2007) | Positive Urgency in addition to the four factors above) | Tendency to act impulsiveley when experiencing positive affect |
| I-7 Impulsiveness Questionnaire (Eysenck et al., 1985) | Impulsiveness | Unconscious risk taking (e.g." I generally do and say things without stopping to think") |
| | Venturesomeness | Conscious sensation seeking (e.g."I quite enjoy taking risks") |

**Table 1.1 (continued)**

| Instrument | Dimensions | Definition/Sample Items |
|---|---|---|
| Impulsiveness Venturesomeness Empathy Questionnaire (IVE; Eysenck & Eysenck, 1978) | Impulsiveness | e.g. "Do you often do things on the spur of the moment?" "Do you get extremely impatient if you are kept waiting by someone who is late?" |
| | Venturesomeness | e.g. "Do you sometimes like doing things that are a bit frightening?" "When the odds are against you, do you still usually think it is worth taking a chance?" |
| | Empathy | e.g. "Would you feel sorry for a lonely stranger in a group?" "Can you remain in a good mood even if those around are depressed?" |
| Functional and Dysfunctional Impulsivity (Dickman, 1990) | Functional Impulsivity | Tendency to act with little forethought when this style is optimal |
| | Dysfunctional Impulsivity | Tendency to act with less forethought than most people of equal ability when this tendency causes difficulty |
| Impulsivity Sensation Seeking Scale (ImpSS; Zuckerman, 2002) | Impulsivity | Items describe a need for thrills and excitement, a desire for unpredictable situations and friends, and the need for novelty and change (Curran et al., 2010) |
| | Sensation Seeking | |
| Adaptive and Maladaptive Impulsivity Scale (AMIS; Eensoo et al., 2007) | Fast Decision Making | Functional impulsivity subscale of Functional/Dysfunctional Impulsivity Scale (Dickman, 1990) |
| | Thoughtlesness | Dysfunctional impulsivity subscale of Functional/Dysfunctional Impulsivity Scale (Dickman, 1990) |
| | Disinhibition | Impulsiveness subscale under Neuroticism scale of NEO-PI (Costa & McCrae, 1989) |
| | Excitement Seeking | Excitement seeking subscale under Extraversion scale of NEO-PI (Costa & McCrae, 1989) |

### 1.3.2.The results of the studies reviewed

#### 1.3.2.1. Impulsivity and Self-Report Inventories of Driver Behavior

In this section, 13 studies that used self-report inventories of driver behavior as the driving related outcome measure will be presented. These studies will be presented in two sections; aberrant driver behaviors and driver anger/aggression (see Table 1.2).

##### 1.3.2.1.1. Aberrant Driver Behaviors

Aberrant driver behaviors examined in the studies included in the present review are violations, errors and lapses measured by different versions of Driver Behavior Questionnaire (DBQ). DBQ has been developed based on a theorethical taxonomy of aberrant behaviors which suggests a distinction between errors and violations having different psychological origins (Reason, Manstead, Stradling, Baxter & Campbell, 1990). Errors are defined as "the failure of planned actions to achieve their intended consequences" (Reason et al., 1990, p. 1315) and are further differentiated as slips, lapses and mistakes. Violations are "deliberate deviations from those practices believed necessary to maintain the safe operation of a potentially hazardous system" (Reason et al., 1990, p. 1316). Some versions of DBQ include lapses involving failures of memory that are embarrassing but not dangerous, such as forgetting where you have parked your car. In addition, violations are further classified as ordinary and aggressive violations (Lawton, Parker, Manstead & Stradling, 1997). Ordinary violations involve deliberate breaking of the highway code without an aggressive motivation, such as speeding. On the other hand, aggressive violations involve overtly aggressive acts such as sounding horn to indicate your annoyance.

Berdoulat, Vavassori and Sastre (2013) measured impulsivity by UPPS Impulsive Behavior Scale adapted to French by van der Linden et al. (2006); and administered DBQ adapted to French by Gabaude, Marquié and Obriot-Claudel (2010). The sample was 455 driving licence holders older than 18 and reporting driving regularly at least once a year. They conducted stepwise (statistical) multiple regression analyses with lapses, errors and violations, as the DV in each analysis. The results showed that perseverance was the only significant impulsivity factor in predicting lapses, whereas urgency and perseverance were significantly related to errors; and UPPS total score was significanlty related to violations. However, when

the correlations between impulsivity dimensions and driver behaviors were examined,

**Table 1.2. Studies investigating the relationship between impulsivity and a driving related outcome**

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Bachoo et al 2013 | 306 post graduate university students from two higher-education institutions | UPPS impulsive Behavior Scale (Whiteside & Lynam, 2001) | Self Reported Acts of Risky Driving Behavior scale (SR-RDB; Iversen, 2004) | Multiple regression | Only lack of premeditation (β=-.26) and sense of urgency(β=-.16) predicting SR-RDB significantly when entered in the analysis with age, gender, driving frequency, driving anger, attitudes toward rule violations, attitudes toward careless driving of others and attitudes toward drinking and driving. | Lack of premeditation (r=-.31), sense of urgency (r=-.33), sensation seeking (r=-.22), lack of perseverance (r=-.23) all sigificantly related to SR-RDB total score |
| Berdoulat et al 2013 | 455 driving licence holders aged 18 and older reporting driving regularly at least a year | French version of UPPS impulsive Behavior Scale (Whiteside & Lynam, 2001) adapted by Van der Linden et al (2006) | French version of DBQ adapted by Gabaude et al (2010) and French version of DBQ Transgression Subscale adapted by Delhomme and Villieux (2005) | Stepwise multiple regression | Sense of urgency (β=.23) and lack of perseverance (β=.37) significantly predicting lapses; Sense of urgency (β=.13) and lack of perseverance (β=.18) significantly predicting errors; UPPS total score (β=.12) significantly predicting violations; none of the impulsivity subscales or UPPS total score significantly predicting DBQ transgression total score. | Impulsiveness (UPPS total score)&lapses r = .32; Impulsiveness (UPPS total score)&errors r = .34; Impulsiveness (UPPS total score) &violations r = .47; Impulsiveness (UPPS total score)&DBQ transgression total score r = .44 |
| Chamorro et al 2012 | 34653 civilian non-institutionalized population residing in households and group quarters | Impulsiveness measured by one item:"Most of the times throughout your life, regardless of the situation or whom you were with, have you often done things impulsively?" | One item asking reckless driving (the rating scale is not given for this item) | Logistic regression | Individuals with impulsivity were found to be significantly more likely to engage in reckless driving compared to individuals without impulsivity. (Odds Ratio Adjusted for sociodemographic characteristics and psychiatric comorbidity: 1.80) | No correlation coefficients given. |

Note: All the given values (e.g., *t, F, β* etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Cherpitel & Tam, 2000 | 499 clients of Drinking Under the Influence of alcohol (DUI) treatment programs (250 white, 249 Mexican American) | Impulsiveness measured by five items taken and adapted from Eysenck and Eysenck (1977) and Jackson (1974) | DUI status; first offender versus multiple offender | Comparison of population proportions & Logistic regression | First offenders found to be less likely to be high on impulsiveness than multiple offenders in the Mexican American sample. Impulsiveness entered in the logistic regression analysis along with sensation seeking and risk perception and found nonsignificant in predicting offender status (first or multiple offender). | No correlation coefficients given. |
| Constantinou et al 2011 | 352 active drivers for at least a year and up to 25 years | Barratt Impulsiveness Scale Version 11 (BIS-11) -Greek version adapted for this study | DBQ modified by Loutsiou-Ladd et al. (2009); total number of self reported driving offences (e.g. Dangerous driving, speeding, driving under the influence of alcohol and other) | SEM | In the final model, nonplanning impulsiveness was a significant predictor of ordinary violations along with sensitivity to reward, disinhibition and driving experience, ordinary violations in turn is associated with traffic offences. | Motor impulsiveness&Ordinary violations r=.27; Motor impulsiveness&Aggressive violations r=.17; Motor impulsiveness&Mistakes r=.24; Attentional Impulsiveness &Ordinary violations r=.06(ns); Attentional impulsiveness &Aggressive violations r=..09(ns); Attentional impulsiveness &Mistakes r=.14; Nonplanning &Ordinary violations r=.22; Nonplanning& Aggressive violations r=.09(ns); Nonplanning&Mistakes r=.21 |

Note: All the given values (e.g., *t, F, β* etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Curran et al 2010 | 160 drivers aged 16 and older (80 convicted of driving while under the influence/driving while intoxicated and attending a drunk driving program, 80 non-offenders) | Impulsivity subscale of ImpSS (Impulsivity Sensation Seeking Scale) developed by Zuckerman (2002) | Driving while under the influence/Driving while intoxicated (DWUI/DWI) status by asking if they had ever been convicted a DWUI/DWI offence | MANOVA | Significant main effect of groups (DWUI/DWI offenders versus non-offenders) on the DV set composed of thrill and adventure seeking, experience seeking, disinhibition, boredom susceptibility, sensation seeking and impulsivity ($F(6,153)=14.25$). The univariate effect of groups on impulsivity was significant. | No correlation coefficients given. |
| Dahlen et al 2005 | 224 undergraduate students | Barratt Impulsiveness Scale Version 11 (BIS-11; Patton et al. 1995) | Crash related conditions, aggressive driving, risky non-aggressive driving behavior measured by Driving Survey (Deffenbacher et al., 2001); Driving Anger Expression Inventory (Deffenbacher et al., 2002); Driving Anger Scale (Deffenbacher et al., 1994) | (Stepwise) Multiple Regression | In the multiple regression analyses in which impulsivity entered the analysis with gender, sensation seeking, boredom susceptibility, driving anger, impulsivity significantly predicted moving tickets ($\beta=.26$), risky driving ($\beta=.23$), and use of the vehicle to express anger ($\beta=.19$) | Impulsiveness&Driving anger expression (DAX)-physically aggressive expression r=.20; Impulsiveness&DAX-verbally aggressive expression r=.17; Impulsiveness&DAX-use of the vehicle to express anger r=.32; Impulsiveness&DAX-adaptive/constructive expression r=-.16; Impulsiveness&Loss of concentration r=.19; Impulsiveness&Loss of control r=.21; Impulsiveness&Close call r=.21; Impulsiveness&Aggressive driving r=.23; Impulsiveness&Risky driving r=.35; Impulsiveness&Driving Anger r=.21 |

Note: All the given values (e.g., *t*, *F*, *β* etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Deffenbacher et al 2003 | 372 student drivers | Barratt Impulsiveness Scale Version 11 (BIS-11; Patton et al. 1995) | Driving anger measured by Driving Anger Scale (Deffenbacher et al., 1994) | MANOVA | Significant main effect of driving anger groups (low anger-no problem, high anger-problem, high anger-no problem drivers) on the DV set composed of trait anger, general anger expression and impulsiveness ($F(10,722)=17.87$). The univariate effect of groups on impulsiveness was also significant ($F(2, 365)=14.02$); low anger-no problem drivers were significantly lower on impulsiveness than high anger-problem drivers and high anger-no problem drivers. | No correlation coefficients given. |
| DePasquale et al 2001 | 96 undergraduate students | Impulsiveness subscale of Eysenck et al.'s L7 scale (1985) | Propensity for angry driving scale (DePasquale et al., 2001) | Correlation | Impulsiveness significantly related to propensity for angry driving ($r=.28$) | |
| Eensoo et al 2004 | 414 male drivers (203 driving while intoxicated by alcohol; 211 control) | Functional and dysfunctional impulsivity measured by a scale based on Dickman Impulsivity Inventory (1990) and impulsivity and excitement seeking subscales of NEO-PI (Costa & McCrae, 1989). | Driving while intoxicated by alcohol group (men caught by Estonian Police) versus control group (randomly selected from the driving licence database) | t-test | Driving while intoxicated by alcohol group had significantly higher NEO-PI impulsivity ($t(406)=3.98$) and dysfunctional impulsivity ($t(407)=4.13$); but no significant difference between the groups on functional impulsivity and excitement seeking subscale of NEO-PI. | No correlation coefficients given. |

Note: All the given values (e.g., $t$, $F$, $\beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Eensoo et al 2005 | 414 male drivers (203 driving while intoxicated by alcohol; 211 control) | Functional and dysfunctional impulsivity measured by a scale based on Dickman Impulsivity Inventory (1990) and impulsivity and excitement seeking subscales of NEO-PI (Costa & McCrae, 1989). | Driving while intoxicated by alcohol group (men caught by Estonian Police) further grouped into two: those who denied driving after drinking the sometimes or often per year and those who reported driving after drinking; and control group (randomly selected from the driving licence database) further divided into two: those who denied driving after drinking sometimes or often per year and those who reported driving after drinking. | ANOVA | The groups differed significantly on NEO-PI impulsivity($F(3,408)=8.37$) after controlling for the effects of age and dysfunctional impulsivity ($F(3,408)=8.55$). Participants in the driving after drinking and reporting group scored higher on dysfunctional impulsivity and NEO-PI impulsivity than the other three groups. | No correlation coefficients given. |
| Eensoo et al 2010 | 909 novice drivers (subjects first recruited while they were attending to driving school to get the driving licence and filled out ompulsivity measure, they filled out the driving skills measure one year later (when they already obtained the licence) | Impulsiveness meausred by AMIS (Eensoo et al, 2007); Barratt Impulsiveness Scale Version 11 using 4-point scale (BIS-11; Barratt, 1994) | Speed limit exceeding; data obtained from the the police database. | Logistic regression | BIS impulsivity, fast decision making, excitement seeking, disinhibition, thoughtlessness,mild social deviance and driving skills entered in the logistic regression analysis in which only disinhibition (OR=1.17) found significant in the women sample; fast decision making (OR=1.09) and excitement seeking (OR=1.09) was found significant in the total sample in predicting the odds of being in the speed limit exceeder versus control(no speed limit exceeding) group. | No correlation coefficients given. |

Note: All the given values (e.g., $t$, $F$, $\beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Eensoo et al 2011 | 1600 driving licence attempters (students of driving schools) | Impulsiveness measured by AMIS (Adaptive and Maladaptive Impulsivity Scale, Eensoo et al., 2007) composed of *thoughtlessness* and *fast decision making* scales based on functional and dysfunctional impulsivity (Dickman, 1990) and *disinhibition* and *excitement seeking* and disinhibition based on impulsivitiy related subscales of NEO-PI (Costa & McCrae, 1989) adapted to Estonian by Pulver et. al. (1995); Barratt Impulsiveness Scale Version 11 (BIS-11; Patton et al. 1995) | Driving while impaired by alcohol; data of three years penalties for drunk driving obtained from police database. | Cox regression model test | Participants in the drunk driver group were more likely to have had higher scores on BIS impulsiveness (hazard ratio=1.10), fast decision making(hazard ratio=1.09), thoughtlessness(hazard ratio1.10) and excitement seeking(hazard ratio=1.14) | No correlation coefficients given. |
| González-Iglesias et al 2012 | 535 drivers from the general population taken from driving assessment centers | Impulsiveness and venturesomeness subscales of the reduced version of Eysenck I-7 by Aluja & Blanch (2007) | 9 items of Highway Code Violations Subscale of DBQ adapted to Spanish by Gras et al 2006 | Hierarchical regression | For males, after controlling for age and milleage, impulsiveness (β= .23) and ventursomeness (β = .15) significantly predicts violations; for females after controlling for age impulsiveness (β= .16) and ventursomeness (β = .15) significantly predicts violations. | Impulsiveness&violations r = .34; ventursomeness&violations r= .34 |

Note: All the given values (e.g., *t*, *F*, *β* etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Jiang et al 2008 | 108 adult drivers driving from 1 to 33 years | 5-item motor impulsiveness scale from short form Barratt Impulsiveness Scale version 15 (Spinella, 2007) | Risky driving behavior (two factors:violation for convenience and angry driving) measured by 9 items from DBQ and 3 items adapted from Xie & Parker (2002) reflecting violation behaviors in China; and punishment record; and history of traffic crashes | SEM | In the final model, motor impulsiveness predicted violation for convenience through its effects on angry driving, and predicts outcome (driving record and crash history) through its effects on violation for convenience. | No correlation coefficients given. |
| Lajunen & Parker 2001 | 270 drivers | Eysenck Impulsiveness Questionnaire I-7 (Eysenck et al., 1985) | Driving anger measured by UK Driving Anger Scale (UK DAS; Lajunen et al., 1998; Deffenbacher et al., 1994) | SEM | Impulsiveness was not significantly related to driver anger or aggression, therefore dropped from the models. In general verbal and physical aggression explained drivers' feelings and reactions to other drivers' behaviors. | No correlation coefficients given. |
| Leal & Pachana 2009 | 126 undergraduate students having a valid driving licence and a minimum of one year unsupervised driving experience | Impulsiveness measured by Eysenck Impulsiveness Questionnaire I-7 (Eysenck et al., 1985) | Australian Propensity for Angry Driving Scale (Leal & Pachana, 2008); self-reported frequency of yelling at other drivers, gesturing at other drivers and feeling angry but doing nothing | Hierarchical Regression | In the three analyses conducted for self-reported frequency of yelling at other drivers, gesturing at other drivers and feeling angry but doing nothing, the propensity for angy driving scores (entered in the third step) explained significant portion of variance after age and gender were entered in the first step; and impulsiveness, venturesomeness and anger were entered in the second step. | Impulsiveness&Yelling at other drivers r=.22; Impulsiveness&Gesturing at other drivers r=.18; Impulsiveness&Feeling angry but doing nothing r=.11 (ns); Impulsiveness&Propensity for angry driving r=.32 |

Note: All the given values (e.g., $t, F, \beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Mayer & Treat 1977 | 60 university students who were licensed drivers | Impulsiveness measured by 10 items taken from MMPI and CPI (e.g. "I do whatever makes me feel cheerful here and now") | Being involved in three or more traffic accidents as the driver in the past three years (accident group) and control group having no accidents in the same time period. | T-test | Accident involved group had significantly higher scores on impulsiveness than no-accident group (t value is not given). | No correlation coefficients given. |
| McCarthy et al 2012 | 29 university students | UPPS-P Scale (Cyders et al., 2007; Whiteside & Lynam, 2001) | Drink driving, participants were classified in the dring driving group if they reported driving after three drinks in two hours within the previous year | t-test | Significant difference between drink driving and non-driving groups on negative urgency ($t(27)=2.89$) and positive urgency ($t(27)=2.29$). | No correlation coefficients given |
| Milia 2013 | 649 drivers recruited while driving on the highways | 12-item Dysfunctional Impulsivity Scale (Dickman, 1990) | Driving performance operationalized as number of times the driver crossed the center line or outside edge of the road; and driver distraction defined as using a cell phone or similar device during the journey. | CFA, Chi-Square Test | Main finding: 9-item revised version of DI scale has a better fit than 12-item version. High dysfunctional impulsivity group had impaired driving performance ($\chi^2=3.90$) and more driving distractions ($\chi^2=8.84$). | No correlation coefficients given. |

Note: All the given values (e.g., $t$, $F$, $\beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Moan et al 2013 | 2603 students (time 1;when they were 17 and attending high school; follow up at time 2, when they were 28) | Impulsiveness measured by 6 items based on Eysenck Personality Questionnaire (Eysenck & Eysenck, 1978) and Barratt Impulsiveness Scale (BIS; Patton et al., 1995) | Frequency of drunk driving during the past 12 months measured by one item. | Moderated regression & ANOVA | Impulsiveness had a moderating effect on the relationship between drinking and drunk driving (F=8.72, based on ANOVA with three impulsiveness groups; low, moderate, high). The effect of drinking on drunk driving was twice as strong in high impulsiveness group compared to low impulsiveness group(in these analyses N=2020), those who reported no drinking excluded). | Impulsiveness (measured at time 2)& Drunk driving measured at time 1 r=.12; Impulsiveness (measured at time 2)&Drunk driving measured at time 2 r=.15 |
| O'Brien & Gormley 2013 | 70 drivers (30 traffic offender, 40 non-offender college students) | Barratt Impulsiveness Scale (BIS; Patton et al. 1995) | Traffic offender status; traffic offender group attending a speed awareness course that is offered as an option to drivers aged between 17 and 25 who have been caught speeding for the first time instead of receiving a fine or penalty points.Non-offender group indicated they had never been involved in an accident and had no penalty points. | ANOVA | Traffic offender group had significantly higher scores on impulsiveness (total BIS score, F(1,71)=5.30); attention impulsiveness (F(1,71)=5.87); and non-planning impulsiveness (F(1,71)=6.04) than non-offender group. No significant difference between groups on motor impulsiveness. | No correlation coefficients given. |

Note: All the given values (e.g., *t, F, β* etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Owsley et al 2003 | 305 older (57-87 years old) adults legally licensed to drive and currently driving | Impulsiveness measured by corresponding items of Eysenck and Eysenck (1978) IVE questionnaire | Driving errors and violations measured by shortened version of DBQ; and traffic accident reports obtained from the Police | Logistic regression | Participants in the high driving errors group were 2.5 times more likely (OR=2.49) to have high impulsivity than those in the low driving errors group. Participants in the high driving violations group were 2.8 times more likely (OR=2.84) to have high impulsivity than those in the low driving violations group. No significant results regarding impulsivity and crash involvement relationship. (adjusted for age, race and gender) | No correlation coefficients given. |
| Paaver et al 2006 | 1004 male drivers (509 controls, 292 exceeding speed limits, 203 drunk drivers | Functional and dysfunctional impulsivity measured by a scale based on Dickman Impulsivity Inventory (1990) and impulsivity and excitement seeking subscales of NEO-PI (Costa & McCrae, 1989) adapted to estonian by Pulver (et. al., 1995) | Driving while intoxicated and speed limit exceeding group (men caught by Estonian Police); control group (randomly selected from the driving licence database). Speed limit exceeding group further divided into high risk drivers (those exceeding the limit at more than 20 km/h at least twice during the perevious year) and speed limit exceeders (those exceeding the limit at less than 20 km/h twice or more than 20 km/h once during the previous year) | ANCOVA | Significant group differences on NEO-PI impulsivity (F=9.19), dysfunctional impulsivity (F=9.42) and functional impulsivity (F=7.17) after controlling for age. High risk drivers had significantly higher dysfunctional and functional impulsivity levels than control group; and higher dysfunctional impulsivity level than speed limit exceeders. Drunk drivers had significantly higher NEO-PI impulsiveness level than control group and speed limit exceeders; and higher levels of dysfunctional impulsivity than control, speed limit exceeder and high-risk driver groups. | No correlation coefficients given. |

Note: All the given values (e.g., *t, F, β* etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Paaver et al 2013 | 1866 driving school students (traffic records taken in the 1 year period after getting the driving licence) | Impulsiveness measured by AMIS (Adaptive and Maladaptive Impulsivity Scale, Eensoo et al., 2007) composed of *thoughtlessness* and *fast decision making* scales based on functional and dysfunctional impulsivity (Dickman, 1990) and *disinhibition* and *excitement seeking* and disinhibition based on impulsivitiy related subscales of NEO-PI (Costa & McCrae, 1989) adapted to estonian by Pulver et. al. (1995); Barratt Impulsiveness Scale Version 11 (BIS-11; Patton et al. 1995) | Active and passive crashes (the crashes where the participants were at fault coded as active crashes, the remaining passive crashes); speeding (penalties for exceeding the speed limit); drunk driving (penalties for drunk driving); and general traffic risk (registered crashes and penalties for any violations) obtained by the traffic police and traffic insurance fund. | Logistic regression | Impulsiveness (measured by BIS-11) significantly related to drunk driving (OR=1.67); passive crashes (OR=1.37); and general traffic risk (OR=1.17).Fast decision making significantly related to exceeding speed limits (OR=1.48) and general traffic risk (OR=1.21). Thoughtlessness significantly related to drunk driving (OR=1.64) and general traffic risk (OR=1.19).Excitement seeking significantly related to exceeding speed limits (OR=1.59) and general traffic risk (OR=1.30). | No correlation coefficients given. |

Note: All the given values (e.g., *t*, *F*, $\beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Pearson et al 2013 | 266 college student drivers | UPPS-P Scale (Cyders et al., 2007; Whiteside & Lynam, 2001) | Driving behaviors measured by DBQ; cell phone use driving (measured by 3 items); traffic citation and involvement in a traffic collision (both measured by a single item asking the participant if s/he ever had a traffic citation and involved in a traffic crash). | Multiple regression & Logistic regression | In the multiple (and logistic) regression analyses with age, gender, driving exposure, driving experience,and five factors of UPPS-P scale as the predictors, positive urgency significantly related to driving errors(β=.44); driving lapses (β=.21); driving violations (β=.19) and traffic citation (β=-.26); negative urgency significantly related to driving violations (β=.18) and cell phone driving (β=.23). | Perseverance&Errors r=-.21; Perseverance&Lapses r=-.16; Perseverance&Violations r=-.13; Perseverance&cell phone driving r=-.02(ns), Perseverance&Traffic citation r=.02(ns), Perseverance&Traffic collision r=.01(ns); Premeditation&Errors r=-.24; Premeditation&Lapses r=-.11(ns);Premeditation&Violations r=-.21; Premeditation& cell phone driving r=-.14, Premeditation&Traffic citation r=-.01(ns); Premeditation&Traffic collision r=.05(ns); Sensation seeking&Errors r=.06(ns), Sensation seeking&Lapses r=.01(ns); Sensation seeking&Violations r=.17; Sensation seeking&Cell phone driving r=.17; Sensation seeking&Traffic citation r=.08(ns); Sensation seeking&Traffic collision r=.04(ns); Positive urgency&Errors r=.44; Positive urgency&Lapses r=.30; Positive urgency&Violations r=.35; Positive urgency&Cell phone driving r=.15; |

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| | | | | | | Positive urgency&Traffic citation r=-.09(ns); Positive urgency&Traffic collision r=.04(ns); Negative urgency&Errors r=.29; Negative urgency&Lapses r=.28; Negative urgency&Violations r=.33; Negative urgency&Cell phone driving r=.21; Negative urgency&Traffic citation r=-.00(ns); Negative urgency&Traffic collision r=.10(ns); |
| Pedersen & McCarthy 2008 | 162 high school aged licenced drivers | 8 item impulsivity subscale of Zuckerman-Kuhlman Personality Questionnaire (ZKPQ, Zuckerman et. Al., 1993) | Drinking and driving behavior measured by the frequency of driving after consuming alcohol over the past 3 months. | Zero-Inflated Poisson regression | In the regression analysis with (time 1) drinking and driving, riding with a drunk driver, alcohol use frequency, new versus established driver status, lincence status, gender as the control variables and sensation seeking, impulsivity, parental monitoring (time2) and alcohol accessibility (time2), impulsivity significantly related to drinking and driving (time 2) (predicted rate coefficient=.10). | No correlation coefficients given.(but stated that "Time 1 Impulsivity was not significantly correlated with time 2 alcohol accessibility and parental monitoring") |
| Renner & Anderle 2000 | 95 traffic offenders in the driver improvement training for juvenile traffic offenders at the Austrian Road Safety Board, and 78 driving school students (as the control group) | 19-item impulsivity subscale of Eysenck & Eysenck IVE (1978) | Traffic offender status: those involved in general traffic offences are taken, alcohol related traffic offences omitted from the traffic offender group. | ANOVA | No significant difference between the traffic offender group and the control group on impulsiveness. | No correlation coefficients given. |

Note: All the given values (e.g., $t$, $F$, $\beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Richer & Bergeron 2009 | 75 men having a valid driver licence and driving at least once a week | Impulsivity facet of French version of NEO-PI-R (Rolland et. al., 1998) | Driving habits (aggressive driving, negative emotional driving and risky driving) measured by Dula Dangerous Driving Index (Dula & Ballard, 2003) French version developed for this study; relative frequency of driving in the 1 hour following cannabis consumption in the last 12 months, number of times in the past 3 years the participant had driven under the influence of alcohol; dangerous driving measured on the driving simulator (speeding and the aggregate score on tailgating, dangerous overtaking, omitting a stop) | Hierarchical regression | After age and driving exposure were controlled in the first step, impulsivity entered in the second step along with sensation seeking and found to be significantly related to driving under the influence of cannabis (β=.23). | Impulsivity&Driving under the influence of cannabis r=.29; Impulsivity&Driving under the influence of alcohol r=.26; Impulsivity&Risky driving r =.43; Impulsivity&Aggressive driving r=.13(ns), Impulsivity&Negative emotional driving r=.19(ns); Impulsivity&Dangerous driving total score r=.32; Impulsivity&Maximum speed on simulator r=-.02(ns); Impulsivity&Aggregate score on simulator (on tailgating, dangerous overtaking and omitting a stop) r= -.07 (ns) |
| Ryb et al 2006 | 756 blunt trauma patients older than 18 (52% of the cases motor vehicle crash, 6% motorcycle injury; but no information on driving status) | Impulsivity measured by five items (e.g., "You might say I act impulsively," "I often act on the spur of the moment without stopping to think" | Frequency or likelihood of seatbelt usage, drinking and driving, speeding for the thrill | Logistic regression | After age, gender, ethnic origin (black versus white), education, drug dependence and alcohol dependence was controlled, impulsivity significantly related to speeding for the thrill (OR=2.91) and low seatbelt use (OR=1.53), but not with drinking and driving. | No correlation coefficients given. |

Note: All the given values (e.g., *t*, *F*, *β* etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Sanbonmatsu et al 2013 | 310 undergraduate students | Barratt Impulsiveness Scale Version 11 (BIS-11; Patton et al. 1995) | Frequency of cell phone usage while driving, and percentage of the time on the phone while driving | Multiple regression & t-test | When entered in the regression analysis along with perceived ability, multi-tasking ability and disinhibition scores, attentional impulsiveness (β=0.002, ns) and non-planning impulsiveness (β=0.101, ns) were not significantly related to cell phone driving. In the t-test analysis, high and low cell phone driving groups did not significantly differ from each other on attentional(t=-0.08,ns), motor (t=0.46, ns) and non-planning impulsivity (t=-0.30, ns). | Attentional impulsiveness&Cell phone driving r=-.03(ns), Motor impulsiveness&Cell phone driving r=.06(ns), Non-planning impulsiveness&Cell phone driving r=-.02(ns) |
| Sloan et al 2014 | 1634 participants older than 18 and have driven a car and and consumed alcohol during the previous month | Impulsivity measured by 12 items Survey on Alcohol and Driving conducted by Batelle Memorial Hospital during 2010-2012 (statistical analayis of the propoerties of the scale by Loewenstein, 2001). | Number of drinking and driving episodes in the previous year (3 levels: never drink and drive, drink and drive 1-4 times, and drink and drive 5 or more times) | Ordinal Logistic Regression | Participants who reported drinking and driving 5 or more times and those reporting 1-4 times of drinking and driving had significantly higher levels of impulsivity than those who had no drinking and driving episodes in the previous year. | No correlation coefficients given. |
| Stanford et al 1996 | 346 college students | Barratt Impulsiveness Scale Version 11 (BIS-11; Patton et al. 1995) | Drunk driving (those who report drunk driving at least three times in the previous year) and seatbelt use (those who report that they rarely wear a seatbelt while driving) | No significance test (only prevalence ratio in each group) | "High impulsive group had a markedly high rate of risk-taking behavior than low impulsive group" | No correlation coefficients given. |

Note: All the given values (e.g., $t$, $F$, $\beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Teese & Bradley 2008 | 181 first year university students having a driving licence | Impulsiveness measured by Disinhibition Scale from the General Temparement Survey (GTS; Watson & Clark, 1993) adapted by Colder & Stice (1998). | Reckless driving measured by corresponding subscale of Reckless Behavior Questionnaire adapted from Bradley & Wildman 2002) | Hierarchical multiple regression | Impulsiveness nonsignificantly related to reckless driving (β=.05, ns) when entered in the analysis in the second step, after gender, relationship status, and social desirability enterd in the first step. | Impulsiveness&Reckless driving r=.23 |
| Treloar et al 2012 | 816 university students who report access to a car or driving at least once in the past month | UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) | Frequency of drinking and driving; quantity of alcohol consumed before driving (ranging from 0 to more than nine drinks/beers) | Hierarchical regression | After gender, drinking frequency and drinking quantity were controlled in the first step, urgency significantly predicted drinking and driving frequency (β=.17) and quantity of drinking before driving (β=.16), the effects of lack of planning, lack of perseverance, and sensation seeking was not significant. | Urgency&Frequency of drinking and driving r=.23; Urgency&Quantity of drinking before driving r=.25; Lack of planning&Frequency of drinking and driving r=.20; Lack of planning&Quantity of drinking before driving r=.23; Lack of perseverance&Frequency of drinking and driving r=.19; Lack of perseverance&Quantity of drinking before driving r=.21; Sensation seeking&Frequency of drinking and driving r=.16; Sensation seeking&Quantity of drinking before driving r=.20 |
| Wickens et al 2008 | 115 university students having a driving licence or a learner's permit | A modified version of I-7 Impulsivity Questionnaire (Eysenck et al., 1985) | Driver behaviors measured by DBQ adapted for North American drivers (Reimer et al., 2005) | Hierarchical multiple regression | After gender and mean driving hours controlled in the first step; impulsivity entered in the second step along with extremely focused attention and inattention, and significantly predicted violations (β=.30) but not lapses (β=.19,ns) or errors (β=.12,ns) | Impulsivity&Driving erros r=.27; Impulsivity&Driving lapses r=.34; Impulsivity&Driving violations r=.47 |

Note: All the given values (e.g., $t, F, \beta$ etc.) are significant unless otherwise stated in parantheses.

## Table 1.2 (continued)

| Study | Subjects | Impulsivity Measure | Driving Related Outcome | Analytical Methods | Results | Impulsivity&Outcome Correlation |
|---|---|---|---|---|---|---|
| Xu et al 2014 | 232 adults having a driving licence | Barratt Impulsiveness Scale version 15 (Spinella, 2007) | Intention to violate traffic rules measured by presenting a scenario and asking questions based on that scenario about the likelihood of driving on a cycle path and waiting for a traffic light to turn green | Hierarchical linear modeling | Impulsiveness did not significantly influence the likelihood of committing a traffic violation. (cognitive impulsiveness $\gamma$ coefficient=0.04,ns; nonplanning impulsiveness $\gamma$ coefficient=0.01,ns; motor impulsiveness $\gamma$ coefficient=0.03,ns) | No correlation coefficients given. |
| Zimbardo et al 1997 | 206 community college students | Impulse control facet of Big Five Questionnaire (Caprara et al., 1993) | Risky driving measured by five items: taking risks while driving, car racing, speeding, taking risks while biking, driving under the influence | Stepwise multiple regression (with backward method) | Impulse control nonsignificant in predicting risky driving when entered in the regression analysis with present time perspective, future time perspective, gender and interactions between gender and present perspective, gender and future perspective, future and present perspectives. | Impulse control&Risky driving r=-.18 |

Note: All the given values (e.g., $t, F, \beta$ etc.) are significant unless otherwise stated in parantheses.

urgency, premeditation and perseverance were significantly positively associated with errors, lapses and violations. Sensation seeking was significantly positively related to violations only.

Constantinou, Panayiotou, Konstantinou, Loutsiou-Ladd and Kapardis (2011) administered Barratt Impulsiveness Scale version 11 (BIS-11, Patton et al., 1995) to measure impulsivity and Greek version of DBQ adapted by Loutsiou-Ladd, Panayiotou, Constantinou and Ioannou (2009) to measure driver behaviors on a sample of 352 drivers aged 25 and older and driving actively at least a year. They used SEM to test a model in which impulsivity dimensions (motor, attentional and nonplanning impulsiveness); sensation seeking dimensions (thrill and adventure seeking and disinhibiton); sensitivity to reward and sensitivity to punishment; age and driving experience were the distal variables predicting driver behavior (aggressive violations, ordinary violations and mistakes of DBQ), which in turn predicts number of self-reported driving offences. In the final model, only nonplanning impulsivity among the impulsivity dimensions was retained. Nonplanning impulsivity predicted driving offences indirectly through ordinary violations, along with disinhibition and sensitivity to reward.

González-Iglesias, Gómez-Fraguela, Romero and Sobral (2012) measured impulsivity by impulsivity subscale of the reduced version of Eysenck I-7 (Aluja & Blanch, 2007) and used the 9-item Highway Code Violations subscale of Spanish adaptation of DBQ (Gras et al., 2006) with a sample of 535 drivers from the general population reached via driving assessment centers. They conducted hirerarchical multiple regression analysis and found that impulsiveness was significantly related to violations after controlling for age and milleage for males. For females, impulsivity and violations relationship was significant after age was controlled.

Jiang, Li and Liu (2008) investigated the relationship between motor impulsiveness and self-reported risky driving behavior. They measured motor impulsiveness by using the corresponding subscale of a brief Barratt Impulsiveness Scale version 15 (Spinella, 2007) and risky-driving behavior by using 9 items from DBQ and 3 items from Xie and Parker (2002) reflecting violation behaviors in China. They also asked the number of traffic crashes,penalty and punishment scores during the illegal driving received by the policemen rather than parking illegally and

the combination of these indicators made up the "outcome" in the analysis. With a sample of 108 adult drivers with driving experience ranging from 1 to 33 years, they conducted SEM for model testing. In the final model, motor impulsiveness predicted angry driving factor of the violations scale both directly and indirectly through optimism bias, and angry driving in turn predicted violation for convenience factor of the violations scale, which predicted the "outcome" involving traffic crash history and penalties and punishment record. In addition, motor impulsiveness directly predicted violation for convenience factor of the violation scale, (which in turn predicted the "outcome") in the final model.

Owsley, McGwin and McNeal (2003) measured impulsiveness by the corresponding items of Eysenck and Eysenck (1978) IVE questionnaire and driving errors and violations by using shortened version of DBQ. The sample consisted of 305 older adults legally licensed to drive and currently driving. They considered impulsivity scores higher than a certain cutoff value (i.e., 8) as high impulsivity and those lower than that as low impulsivity. They also made groups based on driving violations and driving errors, as high and low driving violations; and high and low driving errors groups. Then, they conducted logistic regression analyses with driving errors and driving violations as the dependent variables and impulsivity as one of the independent measures along with age, gender, race, venturesomeness and empathy. The results showed a significant relationship between impulsivity and both driving errors and violations. Participants in the high impulsivity group were 2.5 times and 2.84 times more likely than those in the low impulsivity group to be in the high driving errors group and high driving violations group respectively.

Pearson and colleagues (2013) administered UPPS-P scale (Cyders et al., 2007) and DBQ on 266 college student drivers. Among the five dimensions of impulsivity measured by UPPS-P, positive urgency was the only one that was found to be significantly (and positively) related to all of the three DBQ subscales, namely driving errors, lapses and violations. Negative urgency was significantly positively related to only driving violations and the remaining three dimensions of impulsivity was not significantly related to any of the DBQ factors. However, when the correlation coefficients were examined, it was observed that perseverance was significantly negatively related to errors, lapses and violations. In addition both

positive and negative urgency were found to be significantly positively correlated with all three DBQ factors. In addition, premeditation was negatively significantly related to errors and violations; and sensation seeking was positively significantly associated with violations. Therefore, it can be concluded that positive urgency was the strongest and most robust predictor among these five dimensions.

Wickens, Toplak and Wiesenthal (2008) administered a modified version of Eysenck I-7 Impulsivity Questionnaire (Eysenck et al., 1985) and DBQ adapted for North American drivers (Reimer et al., 2005) to 115 university students having a driving licence or a learner's permit. They conducted three hierarchical regression analyses, for each of the DBQ factors as the DV. In the analyses with driving errors and lapses as the DVs, gender and mean driving errors per day were entered in the first step, and impulsivity, inattention and extremely focused attention dimension of Differential Attention Process Inventory were entered in the second step; but, impulsivity failed to reach significance in predicting either errors or lapses. In the third analysis with driving violations as the DV, the first step was the same with the other two, whereas impulsivity entered the equation in the second step with reactivity, dual attention to cognitive tasks score, consideration of future consequences and extremely focused attention this time and it was found to be significantly positively related to driving violations. In the correlational analyses, impulsivity was found to be significantly and positively related to all the three DBQ factors, but the strongest relationship was with violations, a pattern that is predictable when the multiple regression results are considered.

#### 1.3.2.1.2. Driver Anger and Aggression

In this section, studies investigating the links between impulsivity and driver anger, defined as "the propensity to experience anger while driving" (Dahlen & Ragan, 2004, p. 557) will be presented (see Table 1.2).

Dahlen, Martin, Ragan and Kuhlman (2005) used BIS-11, Driving Survey (Deffenbacher, Lynch, Oetting & Yingling, 2001), Driving Anger Expression Inventory (Deffenbacher, Lynch, Oetting & Swaim, 2002) and Driving Anger Scale (Deffenbacher, Oetting & Lynch, 1994) on 224 undergraduate students. Driving survey measures the frequency of problematic driving behavior and adverse

outcomes in three sections, crash related conditions, aggressive driving and risky non-aggressive driving. Crash related conditions are measured by six items (i.e., losing concentration, having a minor loss of control, having a close call, receiving a moving violation, having a minor accident, and having a major accident). Aggressive driving is measured by 13 items asking the frequency of each behavior in the past three months (e.g., yelling at another driver, broken part of a vehicle in anger etc.). Finally, 16 items were used to measure risky non-aggressive behavior by a frequency scale again that requires responding by considering the past three months (e.g., speeding, driving without a seatbelt etc.). Stepwise multiple regression analysis was conducted with forward selection method using each crash related condition item and four factors of driving anger expression (physical aggressive expression, verbally aggressive expression, use of vehicle to express anger and constructive/adaptive expression) as the DVs. The IVs were age and gender entered in the first step, driving anger entered in the second step, and impulsivity, boredom proneness, sensation seeking entered in the third step. In these analyses, impulsivity was found to be significantly positively related to moving tickets item of crash related conditions and risky driving subscale of driving survey; and use of the vehicle to express anger dimension of driving anger expression inventory. When the zero order correlations were observed, it was found that impulsivity was significanlty positively associated with driving anger; all the four factors of dring anger expression scale; loss of concentration, loss of control and close call items of crash related conditions; and aggressive driving and risky driving factors of the driving survey.

Deffenbacher, Filetti, Richards, Lynch and Oetting (2003) used BIS-11 to measure impulsivity and investigated whether driver groups based on driving anger differ on impulsivity, trait anger and general anger expression with the sample composed of 372 student drivers. They grouped drivers according to scores on Driving Anger Scale (Deffenbacher et al., 1994) combined with whether or not they admit they have a problem with driving anger. There were three groups based on this categorization; high anger drivers admitting their problem, high anger drivers not admitting their problem and low anger drivers who indicate that they do not have a driving anger problem. They conducted MANOVA on the DV set composed of impulsivity, trait anger and general anger expression and found a significant

multivariate main effect of driving anger groups. In addition, there was a significant univariate anger group effect on the measure of impulsivity, such that the low anger no problem group had significantly lower levels of driving anger than both of the high anger groups who admit and do not admit their driving anger problem.

DePasquale, Geller, Clarke and Littleton (2001) administered the impulsiveness subscale of Eysenck, Pearson, Easting and Allsopp (1985) to measure impulsivity and Propensity for Angry Driving Scale (Depasquale et al., 2001) to 96 undergraduate students. Propensity for Angry Driving Scale is made up of 19 different scenarios in which a driver may encounter while driving and participants are required to choose which potential response among the four alternatives reflects the way they would respond in that situation. An example item involves a scenario in which the participant is asked how would s/he respond when s/he has been waiting in the traffic jam for over 20 minutes and suddenly a car lightly bumps from behind. The response alternatives are stepping out of the car and yell at the other driver; ignoring it; yelling out the window at the other driver; and yelling out loud in the vehicle, but not to the other driver. They reported a significant positive correlation between impulsiveness and propensity for angry driving.

Lajunen and Parker (2001) measured impulsiveness by using Eysenck Impulsiveness Questionnaire I-7 ( Eysenck et al., 1985) and driving anger by using UK Driving Anger Scale (Lajunen, Parker & Stradling 1998; Deffenbacher et al., 1994). In this version of DAS (Deffenbacher et al., 1994) not only the anger experienced by each item is measured, but also the expression of anger is measured by asking the participant to choose their most likely reaction in these potentially anger provoking situations among the seven alternatives (1, no reaction; 2, beep horn and or flash lights; 3, gesture at the other road user; 4, wear at and:or verbally abuse the other road user; 5, drive close to:follow the other road user; 6, stop your vehicle and get out, ready to argue; 7, get out of car, prepared to engage physically with the other road user). Two hundred and seventy drivers made up the sample of the study in which SEM was used to test the models to describe how personality and background variables (inclination to verbal and physical aggression, general anger, impulsivity, age and annual milleage) relate to aggressive driver behavior. While building the models, they used the variables that relate significantly to driving anger

and/or aggressive driver behavior by using correlation and multiple regression. Impulsivity was dropped from the models because it did not predict driver anger or aggressive driver behavior in the preliminary analysis.

In the validation study of the Australian Propensity for Angry Driving Scale, Leal and Pachana (2009) administered this scale along with Eysenck Impulsiveness Questionnaire I-7 (Eysenck et al., 1985) to a sample of 126 undergraduate students having a valid driving licence and a minimum of one year unsupervized driving experience. In addition to propensity for angry driving, they asked participants to rate the frequency of yelling at other drivers, making obscene gestures at other drivers and feeling angry but doing nothing during the previous month. They conducted hierarchical regression analyses for each of the self-reported frequency items with the predictors age and gender entered in the first step; anger, impulsiveness and venturesomeness in the second step; and propensity for angry driving entered in the third step. The results showed that none of the variables entered in the second step, including impulsiveness, was related to any of the three outcomes, namely yelling at other drivers, making obscene gestures at other drivers and feeling angry but doing nothing; and propensity for angry driving was the only significant predictor in all the three analyses. When the correlations were examined, impulsiveness was significantly positively related to propensity for angry driving, yelling at other drivers and making obscene gestures at other drivers; but not with feeling angry but doing nothing.

Richer and Bergeron (2009) measured impulsivity by the corresponding facet of NEO-PI French version (Rolland, Parker & Stumpf, 1998) and used the French version of Dula Dangerous Driving Index (Dula & Ballard, 2003) adapted for this study. They conducted the study with 75 men having driving licence who reported driving at least once a week. It was found that impulsivity was significantly positively correlated with the total score of the Dula Dangerous Driving Index and one of its subscales, risky driving, but not significantly correlated with the other two subscales, namely aggressive driving and negative emotional driving.

All in all, it can be argued that impulsivity as a personality trait has significant links with driver behaviors and expressions, such as violations, lapses, errors, anger, anger expression, aggression, measured by self-report instruments.

Except for one study (i.e., Lajunen & Parker, 2001), all the studies in this section reported at least one significant correlation or regression coefficient between at least one dimension of impulsivity measure and one dimension of driver behavior measure used in a given study. An observable pattern was that whereas only one or some of the dimensions of impulsivity scales used in these studies were found to be significantly related to a driver behavior dimension in the multiple regression analysis, most or all of these dimensions had significant zero-order correlations with the outcome at hand. This also shows the importance of including impulsivity in models explaining risky driver behavior. Another observation is that DBQ is the most commonly used self-report instrument in studies investigating the links between impulsivity or in general personality variables and driver behavior.

#### 1.3.2.2. Impulsivity and Driving Under The Influence

Among the 38 studies that met the inclusion criteria for this review, 16 studies investigated the links between impulsivity and driving under the influence of alcohol (and cannabis in one study) as the driving related outcome. A number of different analytical strategies have been utilized in these studies, such as group comparison, logistic regression and multiple regression (see Table 1.2).

##### 1.3.2.2.1. Group Comparison Studies

In the group comparison studies, drivers in the "driving under the influence of alcohol" group were compared with those in the control group (those having no such experiences in the period the study has defined), on mesures of impulsivity. For instance, in the Curran, Fuertes, Alfonso, and Hennessy (2010) study with 160 drivers, half of whom were attending a drunk driving program, significant differences between these two groups on impulsivity measured by impulsivity subscale of Impulsivity Sensation Seeking Scale (ImpSS; Zuckerman, 2002) along with the measures of sensation seeking were reported.

With a sample of 414 male drivers, 203 of whom had been caught by the police driving while intoxicated by alcohol and the remaining 211 selected randomly from the driving licence database, Eensoo, Paaver, Pulver, Harro, and Harro (2004) found that driving under the influence of alcohol group had significantly higher scores on NEO-PI impulsivity and dysfunctional impulsivity subscale of Dickman

(1990), but failed to find significant differences on functional impulsivity subscale (Dickman, 1990).

In the Eensoo, Paaver, Harro, and Harro (2005) study, driving under the influence and the control groups were further divided into two; as those admitting versus denying drinking and driving sometimes or often per year. Four groups were formed; driving while impaired-1 (DWI-1) group (those caught by the police drinking and driving and denying), DWI-2 group (those caught by the police drinking and driving and admitting), Control-1 group (randomly chosen from the driving licence database and denying), and Control-2 group (randomly chosen from the driving licence database and admitting). It was found that the DWI-2 group had significantly higher scores on dysfuntional impulsivity and NEO-PI impulsivity than the other three groups.

As a descriptive analysis in their study on 29 university students, McCarthy, Niculete, Treloar, Morris and Bartholow (2012) found a significant difference between drink driving group, composed of participants reporting driving after three drinks in two hours during the previous year, and control group on negative urgency and positive urgency factors of the UPPS-P scale (Cyders et al., 2007).

In the Paaver, Eensoo, Pulver and Harro (2006) study with 1004 male drivers, it was reported that after the effects of age was controlled, participants in the drunk driving group, who were caught by the police, had significantly higher scores on NEO-PI impulsivity and dysfunctional impulsivity subscale of Dickman (1990) than those in the control group, who were selected randomly from the driving licence database.

With a different analytic strategy, Sloan, Eldred and Xu (2014) investigated whether group membership with regard to the number of drinking and driving episodes in the previous year with three levels; never, 1-4 times and 5 or more times, predicts impulsivity measured by 12 items from Survey on Alcohol and Driving (statistical analysis of the scale reported by Loewenstein, Weber, Flory, Manuck, & Muldoon, 2001) with a sample of 1634 drivers older than 18 and who have driven a car and consumed alcohol during the previous month. The analytic tool was ordinal logistic regression and it was found that participants who reported drinking and driving 5 or more times and those reporting 1-4 times of drinking and driving in the

previous year had significantly higher levels of impulsivity than those who had no drinking and driving episodes in the previous year.

Eensoo, Paaver and Harro (2011) studied with 1600 driving licence holders and used Cox regression model test to investigate if there are significant differences on impulsivenes between the drunk driver group (based on three years penalties for drunk driving obtained from the police database) and control group. They reported that drunk driving group had higher scores on BIS-11 impulsiveness (Patton, Stanford & Barratt, 1995), fast decision making (based on functional impulsivity of Dickman, 1990), thoughtlessness (based on dysfunctional impulsivity of Dickman, 1990) and excitement seeking subscale of NEO-PI (Costa & McCrae, 1989).

Cherpitel and Tam (2000) studied with a sample of 499 clients (250 white, 249 Mexican American) of treatment programs for drinking under the influence of alcohol. They measured impulsivity by using five items taken and adapted from Eysenck and Eysenck (1977) and Jackson (1974). The groups were formed based on offender status; first offenders versus multiple offenders. They compared the population proportions of those having low, medium and high impulsivity scores in first and multiple offender groups. It was found that multiple offenders were significantly more likely to have high impulsivity scores than first offenders in the Mexican sample. However, this was not the case for the White and the total sample.

#### 1.3.2.2.2. Studies Predicting Involvement in Driving Under the Influence

Apart from group comparison studies, three studies used logistic regression as the analytic tool to investigate if the level of impulsivity predicts the probability of driving under the influence of alcohol. Paaver et al (2013) conducted a study with 1866 drivers utilising logistic regression to investigate the relationship between impulsivity and driving under the influence of alcohol. They measured impulsivity by BIS-11 and thoughtlessness, by using items based on dysfunctional impulsivity subscale of Dickman (1990). They found that impulsivity was significantly related to the probability of having penalties for drunk driving.

In the Ryb, Dischinger, Kufera and Read (2006) study with 756 blunt trauma patients older than 18; impulsivity, measured by five items, did not significantly predict the odds of drinking and driving after age, gender, ethnic origin, education,

drug and alcohol dependence were controlled. However, there is no information regarding the driver status of the sample. That is, it was only given that 52 % of these trauma cases were motor vehicle crash and 6 % were motorcycle injury, but, it is not known whether or not the participant was the driver or the passenger or the pedestrian in that particular crash/collision. In addition, it should be noted that in this study, impulsivity was not measured by an established or widely used scale. The reason of this nonsignificant result may be due to these limitations.

In the Cherpitel and Tam (2000) study presented also in the previous section, a logistic regression analysis was conducted in addition to comparing population proportions of offender groups. They found a nonsignificant effect of impulsivity in predicting membership to first offender versus multiple offender group. The nonsignificant result of impulsivity may again be due to the instrument used to measure the construct, since impulsivity was measured by using five items taken and adapted from Eysenck and Eysenck (1977) and Jackson (1974) other than a longer and a widely used impulsvity scale.

#### 1.3.2.2.3. Studies Examining the Association Between Impulsivity and Driving Under the Influence

In addition to studies using group (based on drinking and driving status) comparison and logistic regression, there are studies utilizing different analytical tools. For instance, Richer and Bergeron (2009) conducted a hierarchical multiple regression analysis with 75 male driving licence holders in which impulsivity, measured by NEO-PI impulsivity facet, was found to be significantly related to the frequency of driving in the one hour after cannabis consumption during the past 12 months, after age and driving exposure were controlled in the first step.

Another study utilizing hierarchical multiple regression was conducted by Treloar, Morris, Pedersen, and McCarthy (2012) with 816 university students. They used UPPS Impulsive Behvior Scale (Whiteside & Lynam, 2001) to measure impulsivity. The results revealed a significant effect of urgency dimension on the frequency of drinking and driving and on the quantity of drinking before driving. However, the other three dimensions of impulsivity measured by UPPS, namely lack of planning, lack of perseverance and sensation seeking was not significantly related

to neither the frequency of drinking and driving nor the quantity of drinking before driving.

Stanford, Greve, Boudreaux, Mathias and Brumbelow (1996) conducted a comparison of groups based on impulsivity levels with a sample of 592 college students. The analysis was conducted with 346 participants because the high impulsiveness group was defined as those scoring one standard deviation above the mean score on the BIS-11 and low impulsiveness group was defined as those scoring one standard deviation below the mean score. No significance test was conducted, prevalence ratios were presented. In the college sample, drunk driving risk was 53.3 % in the high impulsivity group, whereas it was 31.8 % in the low impulsivity group. The analysis in this study was actually conducted with a larger sample including high school students, but sticking with the inclusion criteria of the present review, only analysis results with college students (who can be legal drivers) are reported here.

Pedersen and McCarthy (2008) conducted a study with a sample of 162 high-school aged licensed drivers and reported zero inflated Poisson regression coefficients for the relationship between impulsivity measured by 8-item impulsivity subscale of Zuckerman-Kuhlman Personality Questionnaire (ZKPQ, Zuckerman, Kuhlman, Joireman, Teta & Kraft, 1993) and frequency of driving after consuming alcohol over the past three months. It was found that impulsivity measured at time 1 was significantly related to the frequency of drinking and driving measured at time 2 (7 months after time 1).

Finally, the moderating effect of impulsivity on the relationship between drinking and drunk driving was investigated by Moan, Norström, and Storvoll (2013) with a sample of 2020 students first contacted when they were 17, and 9 years later, when they were 28. Impulsivity was measured by six items based on Eysenck Personality Questionnaire (Eysenck & Eysenck, 1978) and BIS, and frequency of drunk driving was measured by one item. They reported that impulsivity had a moderating effect on the relationship between drinking and drunk driving such that the effect of drinking on drunk driving was twice as strong in high impulsiveness group compared to low impulsiveness group.

In general, the results of the studies reviewed here show that impulsivity as an individual difference variable is related to driving under the influence. Fifteen out of

16 studies cited, reported a statistical significance test for the relationship between impulsivity and driving under the influence of alcohol. Among these 15 studies, 12 of them reported significant results and only three of them reported nonsignificant results. Two of these nonsignificant results may be due to the tools used for measuring impulsivity. In the third study reporting a nonsignificant relationship, one of the dimensions of the UPPS sclae of impulsivity was still significant. Therefore, it can be concluded that impulsivity as a personality trait is related to drinking and driving behavior.

#### 1.3.2.3. Impulsivity and Traffic Offences Other Than Driving Under The Influence

Among the studies selected for inclusion in this review, 10 studies examined the links between impulsivity and actual offences (other than driving under the influence) as the driving related variable (see Table 1.2). These studies will be presented in three sections. In the first one, studies examining the relationship between impulsivity and speeding will be presented. In the second one, studies investigating accident involvement in relation to impulsivity will be presented. Finally, in the third section, studies that combined accident involvement data with punishment and penalty scores or other offences to make a general index will be presented.

##### 1.3.2.3.1. Speeding

Eensoo, Paaver and Harro (2010) used speed limit exceeding data obtained by the police database as the outcome variable and used Adaptive and Maladaptive Impulsivity Scale (AMIS; Eensoo, Harro, Pullmann, Allik & Harro, 2007) and BIS-11 to measure impulsivity.AMIS includes four factors; fast decision making (based on functional impulsivity items of Dickman, 2010), thoughtlessness (based on dysfunctional impulsivity items of Dickman, 2010), disinhibition and excitement seeking based on impulsivity related subscales of NEO-PI (Costa & McCrae, 1989). They conducted logistic regression analysis to investigate if being in the speed limit exceeding group versus control group could be predicted by BIS-11 impulsivity, AMIS dimensions of impulsivity,mild social deviance and driving and safety skills measured by DSI (Lajunen & Summala, 1995) for men, women and total sample

data. It was found that BIS-11 impulsivity was not significant in any of the three samples; disinhibition dimension of AMIS impulsivity scale was significantly related to the odds of being in the speed limit exceeding group in the women sample; and fast-decision making and excitement seeking dimensions of AMIS scale were significant in predicting being in the speed limit exceeding group in the total sample.

O`Brien and Gormley (2013) used speeding as the outcome variable and measured impulsivity by BIS. The offender group composed of 30 individuals caught speeding for the first time and attending a speed awareness course (instead of receiving a fine or penalty points) and the control group consisted of 40 individuals who reported that they had never been involved in an accident and had no penalty points. They conducted ANOVA to compare the groups on the three dimensions of BIS impulsivity scale. They found that the offender group had significantly higher scores on total BIS scores, attention impulsiveness and nonplanning impulsiveness, but not on motor impulsiveness.

In the Paaver et al. (2006) study cited in the previous section, speed limit exceeding data obtained from the police database were used. The participants in the control group were randomly selected from the driving licence database. Speed limit exceeding group was further divided into “high risk drivers” (those exceeding the limit at more than 20 km/h at least twice during the perevious year) and “speed limit exceeders” (those exceeding the limit at less than 20 km/h twice or more than 20 km/h once during the previous year). It was found that high risk drivers had significantly higher dysfunctional and functional impulsivity levels (measured by functional/dysfunctional impulsivity scale (Dickman, 1990) than control group; and higher dysfunctional impulsivity level than speed limit exceeders.

#### 1.3.2.3.2. Accidents

Mayer and Treat (1977) used number of accidents the participant has been involved as the driver in the past three years. From the sample of 60 university students who were licensed drivers, those reporting three or more accidents were classified as the accident involved group and those reporting no accidents during that time period were in the control group. Impulsivity was measured by using 10 items taken from two different general personality tests (not specifically designed to measure

impulsivity). They conducted a t-test to investigate if there is a significant difference between the accident involved group and control group in terms of impulsivity levels. They found that the accident involved group had significantly higher levels of impulsivity than the control group.

Owsley and colleagues (2003) used accident reports from all police-reported crashes over the past eight years period of the 305 older adults legally licensed to drive and currently driving. As explained in the previous section, they grouped the participants based on their impulsivity levels. They conducted a logistic regression analysis with crash involvement as the DV, however, impulsivity did not significantly predict crash involvement.

#### 1.3.2.3.3. Offences and Accidents Combined

Jiang et al. (2008) study cited above investigated the predictors of actual traffic offences. They used the combination of the number of traffic crashes, penalty and punishment scores as the outcome variable and tested a model in which motor impulsivity, measured by the corresponding subscale of BIS-shortened version (Spinella, 2007) predicts this outcome variable through optimism bias and two factors of risky driving behavior (angry driving and violation for convenience). The tested model achieved acceptable fit.

Paaver et al. (2013) obtained police records and traffic insurance fund in the one year period after the 1886 participants who were contacted first when they were in driving school have got their driving licences. The data includes penalties for exceeding the speed limit, active and passive crashes (crashes where the participant was at fault were active crashes and others were classified as passive crashes). A composite score of "general traffic risk" including registered crashes and penalties for any violations. Impulsivity was measured by AMIS and BIS-11. Logistic regression analyses with each of the outcome measures as the DV and some background variables like age and gender and impulsivity dimensions measured by AMIS and BIS as the IVs were conducted. The results showed a significant effect of BIS impulsivity on involvement in passive crashes and general traffic risk (having any crashes or violations). Among the AMIS dimensions, fast decision making was significantly related to exceeding speed limits and general traffic risk;

thoughtlessness was significantly related to only general traffic risk, and excitement seeking was significantly associated with exceeding speed limits and general traffic risk. Disinhibition was not significantly related to any of the outcome measures.

Pearson et al. (2013) asked participants to indicate if they have ever received a traffic citation and if they have ever involved in a traffic crash and used logistic regression for each of the dichotomous outcomes as the DV and UPPS-P impulsivity dimensions, age, gender, driving exposure and driving experience predict as the predictors. It was found that only positive urgency significantly negatively predicted having traffic citation; the other four dimensions did not significantly predict neither traffic crash involvement, nor having traffic citation.

Constantinou et al. (2011) study cited above, used the number of self-reported offences (i.e., dangerous driving,speeding,driving under the influence of alcohol and other) as the DV in their model. They tested the fit of the model and the final model achieving acceptable fit included an indirect path from nonplanning impulsivity to self-reported offences through ordinary violations.

Renner and Anderlee (2000) compared a group of 95 traffic offenders who were involved in general traffic offences other than alcohol related offences to a control group of 78 driving school students on 19 item impulsivity subscale of Eysenck & Eysenck (1978). However, they found no significant difference between the groups on the measure of impulsivity.

In general, impulsivity seems to be related to traffic offences (other than driving under the influence) since only two studies failed to find a significant relationship. Traffic offences mostly used in relation to impulsivity was accident involvement and speed limit exceeding. In some studies, these indices along with other penalty and punishment scores were combined to make a general offence variable.

#### 1.3.2.4. Impulsivity and Other Behaviors and/or Measures Related to Risky Driving

The reason of presenting these studies under “other behaviors or measures” is that the driving related outcome examined in these studies do not match with those of the studies presented in the preceeding three sections in terms of conceptual and measurement related issues. Among the 11 studies presented in this section, one

study investigated risky driving by a simulated driving task, two studies used reckless driving, three studies used cell phone use while driving, two studies used seatbelt use, one study used speeding for the thrill, one study used intention to violate traffic rules, one study used risky driving (five different behaviors each measured by one item), and one study used a self-report scale measuring the frequency of varios different risk taking behaviors while driving, as the driving related measure. These studies were presented in this section since they did not fit any of the remaining three sections regarding the driving related outcomes.

Bachoo, Bhagwanjee and Govender (2013) administered UPPS Impulsive Behavior Scale and Self Reported Acts of Risky Driving Behavior Scale (SR-RDB; Iversen, 2004) to 306 post graduate students. SR-RDB is composed of specific questions on self-reported acts of risk-taking while driving. The questions of the scale require responding on a 5-point frequency scale. There are seven subscales namely violation of traffic rules/speeding; reckless driving/funriding; not using seatbelts; cautious and watchful driving; drinking and driving; attentiveness towards children in traffic; and driving below speed limits. In the multiple regression analysis, age, gender, driving frequency, driving anger scale total score, attitudes toward rule violations/speeding, attitudes toward careless driving of others, attitudes toward drinking and driving, and four dimensions of the UPPS Impulsive Behavior Scale (lack of premeditation, sense of urgency, sensation seeking and lack of perseverance) were used as the independent variables and the DV was SR-RDB total score. Among the four dimensions of impulsivity, only lack of premeditation and sense of urgency were found to be significantly related to self reported acts of risky driving (total score obtained by the scale) . In the correlational analyses with the four impulsivity dimensions and factors of the SR-RDB scale, lack of premeditation was significantly and positively correlated with “violation of traffic rule/speeding”, “reckless driving” and “drinking and driving”; and significantly negatively correlated with “cautious and watchful driving” and “attentiveness to children in traffic”. Sense of urgency was significantly positively associated with “violation of traffic rule/speeding”, “reckless driving and drinking and driving”, and significantly negatively associated with “seatbelt usage”, “cautious and watchful driving” and “attentiveness to children in traffic”. Sensation seeking was significanlty positively

related to “violation of traffic rules/speeding” and “drinking and driving”, and significantly negatively related to only “seatbelt usage”. Finally, lack of perseverance was significanlty positively correlated with “reckless driving” and “drinking and driving”, and significantly negatively correlated with “cautious and watchful driving” and “attentiveness to children in traffic”.

In a national study population, Chamorro and his colleagues (2012) investigated the prevalence of impulsivity and its associations with a number of psychological disorders, adverse events, socio-demographic characteristics and behavioral outcomes. The sample consisted of 34653 civilian non-institutionalized population. Participants were considered in the “impulsive” group if they responded affirmatively to the following question: “Most of the times throughout your life,regardless of the situation or whom you were with, have you often done things impulsively?”. Reckless driving was one of the “adverse events” examined in the study (along with starting fights, shoplifting, suicidal attempts or threats etc.) and it is not clear whether it was measured on a frequency scale or on a yes-no scale measuring life time involvement. In the logistic regression analysis, it was found that impulsive group was more likely to engage in reckless driving compared to participants in the non-impulsive group.

Teese & Bradley (2008) used Disinhibition Scale from the General Temparement Survey (GTS; Watson & Clark, 1993 adapted by Colder &Stice,1998) to measure impulsivity and 5-item reckless driving subscale of Reckless Behavior Questionnaire (RBQ; adapted from Bradley &Wildman, 2002) to measure reckless driving with a sample of 181 first year university students having a driving licence. They conducted a hierarchical regression analysis in which gender, relationship status and social desirability were entered in the first step, impulsivity in the second step, peer pressure in the third step, perceived risk and perceived benefits in the fourth step, and reckless driving was the DV. Impulsivity was not significantly related to reckless driving in this analysis. However, when the zero-order correlations were examined, impulsivity was significantly correlated with reckless driving.

Xu, Li and Jiang (2014) administered Barratt Impulsiveness Scale version 15 (Spinella, 2007) to 232 adults having a driving licence and used scenarios to measure intention to violate traffic rules. After the participants read the scenarios, they were

asked to rate their intentions to perform a behavior on 5-point scale. In the first scale, they were asked to indicate the likelihood that they would drive on a cycle path, and in the second, the likelihood that they would remain and wait for a traffic light to turn green (reverse coded). The scores from these two scales were averaged and higher scores indicated greater intention to violate traffic rules. They used hierarchical linear modeling since both within-subjects and between-subjects effects were investigated. However, it was found that impulsivity dimensions measured by BIS, namely motor impulsiveness, nonplanning impulsiveness and cognitive (attentional) impulsiveness, were not significantly related to the likelihood of committing a traffic violation.

Richer and Bergeron (2009) study presented above used a simulated driving task to measure dangerous driving. The maximum speed reached and aggregate score based on tailgating, dangerous overtaking and omitting a stop were used as measures of dangerous driving. However, the correlation of impulsivity with maximum speed reached and with the aggregate score of dangerous driving were not significant.

Milia (2013) used 12-item dysfunctional impulsivity scale of Dickman (1990) to measure impulsivity with a sample of 649 drivers recruited while driving on the highways. Driving performance was operationalized as the number of times the driver crossed the center line or outside the edge of the road. Driving distraction was defined as using a cell phone or a similar device during the the journey. The 30th and 70th percentiles of the dysfunctional impulsivity scale were used to create low and high impulsivity groups and these groups were compared on driving performance and driving distraction by using $\chi^2$ test. It was found that high impulsivity group reported significantly more impaired performance and driving distractions than low impulsivity group.

Pearson et al. (2013) study described above also used a three item measure of cell phone driving (How often do you talk on a mobile phone while you are driving a motor vehicle?"; "How often do you send text messages on a cell phone while you are driving a motor vehicle?"; "How often do you read text messages on a cell phone while you are driving a motor vehicle?"). UPPS-P (Cyder et al., 2007) was used to measure impulsivity and it was found that sensation seeking, positive urgency and negative urgency dimensions were significantly positively and premeditation was

significantly negatively correlated with cell phone driving measure. In addition, a multiple regression analysis was conducted with cell phone driving measure as the DV and among the UPPS-P dimensions, only negative urgency was significantly positively related to cell phone driving.

Sanbonmatsu, Strayer, Medeiros-Ward and Watson (2013) studied with 310 undergraduate students to investigate cell phone use while driving. They measured this behavior by the frequency of cell phone use while driving and percentage of the time on the phone while driving. Impulsivity was measured by using BIS-11. A multiple regression analysis with cell phone use while driving as the DV, and attentional impulsivity and nonplanning impulsivity, perceived ability, multi-tasking ability and disinhibiton scores as the predictors was conducted. However, the effects of both nonplanning and attentional impulsivity failed to reach significance. In addition, a t-test analysis was conducted by grouping the participants as high and low cell phone users while driving and comparing these groups on the BIS-11 impulsivity dimensions. However, the high and low cell phone driving groups did not differ significantly from each other on any of the attentional, nonplanning and motor impulsivity dimensions.

Ryb et al. (2006) study cited above used frequency or likelihood of seatbelt use and speeding for the thrill. Low seatbelt use was operationalized as less often than "nearly always". Speeding for the thrill was operationalized as positive when it is reported to be more frequent than rarely. Logistic regression analyses with low seatbelt use and speeding for the thrill as the DVs were conducted and impulsivity was found as a significant predictor of both of these outcomes. Participants having high levels of impulsivity were more likely to report low seatbelt use and to respond positively to speeding for the thrill item.

Stanford et al. (1996) study presented above also reported a comparison of prevalence ratios of seatbelt use in high and low impulsivity groups. Among the college student sample, rarely using seatbelt was 56.7 % in the high impulsivity groups, while it was 42.21 in the low impulsivity group. The authors conclude that high impulsivity group had a markedly high rate of risk taking behavior than low impulsivity group.

Zimbardo, Keough and Boyd (1997) measured risky driving by five items that requires responding on a 5-point frequency scale, namely taking risks while driving, car racing, speeding, taking risks while biking and driving under the influence. Impulsivity was measured by the impulse control facet of Big Five Questionnaire (Caprara, Barbaranelli, Borgogni & Perugini, 1993) and the study sample consisted of 206 community college students. They conducted stepwise (statistical) regression analysis with backward method and found that impulsivity was not significantly related to the risky driving score when entered in the analysis with present time perspective, future time perspective, gender and interactions between gender and present perspective, gender and future perspective, future and present perspectives. However, the zero-order correlation between impulsivity and risky driving was significant.

Using very different measures with a variety of methods, the studies presented in this section have rather mixed results regarding the effect of impulsivity in explaining the given driver behaviors. The only study using a simulated driving task to measure risky driving reported nonsignificant results. Among the three studies investigating cell phone use while driving, two reported a significant relationship with impulsivity, whereas one of them reported a nonsignificant relationship. Seatbelt use was investigated in two studies, one of which reported a significant effect of impulsivity, and the other did not use a statistical significance test, rather reported a general trend that involves a greater risk in high impulsivity group. One of the two studies investigating reckless driving reported a significant result of a logistic regression in which high and low impulsivity groups predicts reckless driving significantly, whereas in the other study, results of the regression failed to support a significant effect of impulsivity on reckless driving, but the zero-order correlation was significant. One study investigated intentions to violate traffic rules and reported nonsignificant effect of impulsivity. One study examining risky driving measured by a combination of five different risky driving behavior, reported a nonsignificant relationship between impulsivity and risky driving total score in the multiple regression analysis, but reported a significant zero-order correlation coefficient for this association. Finally, one study investigating the self-reported acts of risky driving including seven different risky driving factors such as seatbelt use,

rule violations, drinking and driving, attentiveness to children in traffic, reported significant relationships between two factors of the impulsivity scale used and the total score obtained on the combination of these various risky driving factors. It is rather surprising that there are very few studies that have investigated seatbelt use and cell phone use while driving in relation to personality, specifically impulsivity.

### 1.4. Overall summary of the literature review

The purpose of this study was to review the literature on the relationship between impulsivity and unsafe driver behavior and outcomes. The results of the studies reviewed showed that impulsivity is related to i) aberrant driver behaviors and driving anger/aggression, ii) driving under the influence, iii) traffic offences and accidents, iv) driving related outcomes in the "other" category (e.g., risky driving measured on a driving simulator). Among the aberrant driver behaviors, violations were the most consistently reported behavior taht has been found to be positively linked with impulsivity. It can be argued that, violations such as exceeding the speed limit or overtaking a slow driver from the inside are related to one of the basic features of impulsivity defined in the literature involving difficulties in behavioral inhibition (Barratt, 1972; Monterosso & Ainslie, 1999). That is, the driver reporting such behavior knows (assuming that s/he has a driving license) that these behaviors are against the rules and regulations and that they should not display them, but they have difficulty inhibiting the urge to do so. Impulsivity was also found to be positively associated with driving anger and aggression in most of the studies reviewed. Dahlen and colleagues (2005) suggested that impulsivity may be related to a type of "impulsive aggression" (p. 342) that characterizes most aggressive driving and to general anger and aggression (Stanford & Barratt, 1992), which explains the positive links between impulsivity and driving anger/aggression. With regard to driving under the influence, a significant association with impulsivity has been reported by most the studies reviewed here. Driving under the influence seems to be related to the other defining feature of impulsivity, which is acting without little or no consideration of the consequences of actions (Caci et al., 2003). Traffic offences and accidents have also been found to be associated with impulsivity, with the mostly studied offence being speeding. Traffic offences are violations of the rules and regulations and it can be argued that having little or no forethought of the

consequences, be it crashes or penalties, combined with problems in self-control, drivers having high impulsivity level would engage in these behaviors. Finally, in the "other" category, there are studies using a variety of outcome measures that did not fit the other sections and revealed rather mixed results. This mixed pattern may be due to the varying nature of the measurements regarding the driving related outcome (e.g., risk taking measured on a driving simulator, self-reports of seatbelt usage, self-reports of cell phone usage while driving) used in these studies.

Among the 38 studies reviewed here, impulsivity failed to relate significantly to the driving related measure in any analyses conducted in that study in only four studies. The studies utilized a number of different analysis techniques, mostly t-test and ANOVA in group comparisons, structure equation modeling, hierarchical linear modeling and different regression models, namely logistic regression, multiple regression, Cox regression, zero-inflated Poisson regression. When the zero-order correlations were examined, it was observed that they ranged between .00 and .47. In general, the relationship between impulsivity and self-report measures of driver behavior tended to be stronger than the reported relationships between impulsivity and collision involvement or traffic citations. This may be due to the nature of these outcome measures, that is, these measures have much smaller variance than other, especially self-report, measures.

The usage of a variety of driving related outcomes involves usage of different methods and techniques to measure these outcomes, each having its own shortcomings. For instance, usage of number of accidents is problematic in nature. One of the problems with using number of accidents is the fact that accident number as a variable has a Poisson distribution, therefore it violates the basic normality assumption of the analyses based on general linear model. Hence, when using this variable, analysis techniques such as standard regression, correlation , ANOVA or t-test should not be used, otherwise the results cannot be interpreted correctly (Lajunen, 2002). In addition to the distribution, another problem with using accident number if it is based on self-report is the fact that it is underreported, either on purpose ("deliberate impression management") or due to not remembering each incident (Lajunen, 2002). Accident statistics obtained by police records are free of issues such as biases or forgetting, but, there are other issues to be considered when

using accident statistics based on police records. For instance, there is no detailed information about the driver such as his/her behaviors before and during the accident. Another issue is that small-scale accidents or incidents are not reported to the police or insurance companies, which distorts the real number.

Self-report inventories to measure driver behaviors and skills also do not come without shortcomings. The first one is that drivers are not always aware of their automated processes and behaviors while driving (Lajunen & Özkan, 2011). Another problem with self-report measures of driver behaviors is social desirable responding, which involves a tendency to give answers that make the respondent look good (Paulhus, 1984). Therefore it would be reasonable to expect that individuals would tend to report their aberrant behaviors while driving to a smaller extent than the actual case not to look bad or irresponsible. Despite these difficulties and complications of the measurement tools that are used in the studies included in the present review to measure the driving related outcomes, there is still a consistent pattern that impulsivity, which is also measured by a variety of different scales based on different conceptualizations, is reported to relate significantly to the driving related outcome in most of the studies. This strengthens the conclusion that impulsivity is related to driving related outcomes.

The results of the studies using aberrant driver behaviors and driving anger/aggression as the outcome showed that impulsivity as an individual difference variable is related to driver behaviors -especially violations, driving anger, anger expression and aggression measured by self-report instruments. Except for one study (i.e., Lajunen & Parker, 2001) in the first section presenting results of studies using aberrant driver behaviors and driving anger/aggression, all studies reported significant relationships between impulsivity and the dimension of driver behavior examined in the study. The results of these studies had a similar pattern in terms of significance of the relations between different dimensions of impulsivity and driver behavior/anger. That is, due to the associations between the different impulsivity dimensions with each other, results of the multiple regression analyses yielded weaker relationships between these dimensions and the driver behavior/anger than when the relationship between an impulsivity dimension and driver behavior/anger was investigated by correlation analysis. However, which specific dimension of

impulsivity explained higher variance in the driver behavior/anger than the other dimensions differed from study to study. There was no clear picture in terms of this issue. It can be suggested that an impulsivity scale developed specifically for the traffic or driving context may overcome the inconclusive nature of this pattern.

In another section, the results of the studies investigating the links between impulsivity and driving under the influence were presented. It can be concluded that impulsivity as a personality variable is associated with driving under the influence. Only three studies reported a nonsignificant result among the 15 studies reporting a statistical significance test for the relationship between impulsivity and driving under the influence. In fact, the nonsignificant effect of two of these three studies may be attributed to the impulsivity measures used. Again, a specific "impulsivity in driving" measure may help overcome this issue. All in all, it can be concluded that impulsivity is related to drinking and driving behavior.

The results of the studies investigating the associations between traffic offences other than driving under the influence were presented in another section. Accident involvement and speed limit exceeding were the mostly examined traffic offences in relation to impulsivity. Yet other studies used these indicators along with penalty scores and combined them to make a general index of traffic offences. Two out of 10 studies reported nonsignificant results, therefore, in general, it can be claimed that impulsivity is associated with traffic offences other than driving under the influence.

In other studies, rather mixed results appeared with regard to the relationship between impulsivity and driver behaviors examined as the outcome. Two out of three studies examining the relationship between impulsivity and cell phone use while driving reported significant results. One study used a simulated driving task to measure risky driving as the outcome and reported a nonsignificant relationship between impulsivity and risky driving. One study used intentions to violate traffic rules as the outcome and reported a nonsignificant relationship with impulsivity. Two studies examined reckless driving, and both of them reported at least one significant result. One study used risky driving measured by five items, reflecting a different risky driving behavior each, and reported a significant association (i.e., correlation). Another study investigating the self-reported acts of risky driving

reported significant associations between two factors of the impulsivity scale used and the total combined score on this self-reported acts of risky driving scale. Finally, two studies investigated seatbelt use. One of them reported a significant effect of impulsivity, and the other did not use a statistical significance test, rather reported a general trend that involves a greater risk in high impulsivity group. These mixed results show that there is need for more studies clarifying the links between impulsivity and different driver behaviors, especially seatbelt use and cell-phone use while driving.

All in all, if the variety of methods to measure the driving related outcomes used in the studies reviewed are considered, it can be claimed that the general pattern of significant relationships between impulsivity and these different outcomes provides further support for the conclusion that impulsivity is related to driving related outcomes.

### 1.4.1. An integrative conceptual framework for driving style/behavior

Fifty percent of studies investigating accident involvement as the outcome reported nonsignificant relationships with impulsivity (studies using accident involvement in combination with other offences to make a general index are excluded in this estimation). It can be argued that if the indirect relationship between impulsivity and accident involvement mediated by driver behavior had been examined, these studies would have found significant effects of impulsivity. In addition, the relationship coefficients reported between impulsivity and aberrant driver behaviors, driving anger/aggression, driving under the influence are rather stronger than that of impulsivity and accident involvement. Hence, these results seem to fit the general contextual mediated model (Lajunen, 1997; Sümer, 2003) in which personality characteristics are considered in the distal context affecting accident involvement through the proximal context involving human factors in driving (i.e., driver behavior and skills).

The idea of the model is actually based on Elander and colleagues` (Elander, West & French, 1993) attempts to explain why only a small amount of variance in crash involvement can be attributed to personality factors. They proposed a distinction between driving style (i.e., driver behavior) and driving performance (i.e.,

driver skill) and reported that driving style is influenced by certain personality characteristics. Supporting this view, West, Elander and French (1993) suggested that personality traits have an indirect effect on accident involvement, through their effect on driving style and they reported a partially mediated relationship between social deviance and accidents through faster driving speed. Similarly, Rimmö & Åberg (1999) reported that the relationship between sensation seeking and accidents was mediated by driver behavior namely violations and mistakes. All in all, these results indicate the need for examining the relationship between personality variables and accident involvement in an indirect fashion through their effects on driver behaviors. However, only two out of 38 studies in the present review used this approach (i.e., Constantinou et al., 2011; Jiang et al., 2008). Therefore, in future studies investigating the role of impulsivity in accident involvement, the examination of its indirect affect through driver behavior (see Figure 1.1) would be an important contribution.

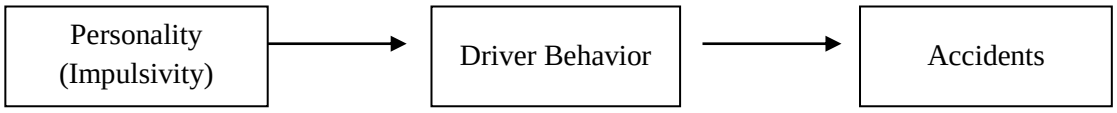


*Figure 1.1*. The general contextual mediated model (adapted from Lajunen, 1997 and Sümer, 2003).

In addition to aberrant driver behaviors and offences such as speeding, drinking and driving, namely negative driver behaviors, the effects of personality, specifically impulsivity, on accident involvement may be investigated through positive driver behaviors. Positive driver behaviors were defined by Özkan and Lajunen (2005a) as behaviors enacted with an intention to take care of the traffic environment or other road users and to help and to be polite with or without safety concerns. These behaviors are not necessarily based on regulations, nor displayed by taking safety into account. As an example, a driver with an intention to avoid a puddle that might splash water on pedestrians may cross the barrier line. This behavior, having a good intention may even cause a small accident in the worst case.

Since drivers display these kinds of behaviors in every day driving, it is important to integrate positive driver behaviors in a model attempting to explain the antecedents of accidents to achieve a complete picture of the issue at hand.

With regard to impulsivity and positive driver behaviors, it can be expected that impulsivity as a personality trait has a negative effect on the enactment of positive driver behaviors. That is, it would be plausible to expect that a driver scoring high on the trait of impulsivity would be less likely to "let pedestrians cross even it is his/her right to pass", "give his/her right of way to other drivers", or "park his/her car by taking into other road users` free movement" (sample items from the Positive Driver Behaviors Scale; Özkan & Lajunen, 2005a).as impulsivity involves "... an inability to wait, a tendency to act without forethought, insensitivity to consequences and an inability to inhibit inappropriate behaviors ..." (Reynolds, Ortengren, Richards & de Wit, 2006, p. 306).

Another important contribution would be integrating the functional and dysfunctional conceptualization of impulsivity in driver risk taking research. In the present literature review, there were only three studies using Dickman's (1990) functional and dysfuntional impulsivity scale and three studies using a scale, namely AMIS (Eensoo, et al., 2007) that includes two subscales based on this functional and dysfunctional impulsivity conceptualization. All of these six studies are conducted by the same group of researchers. Therefore, it can be argued that except from the studies conducted by this group of researchers, none of the studies in this review investigated impulsivity and driver behavior relationship with the functional and dysfunctional impulsivity perspective. However, studying the functional view of impulsivity may be a fruitful research topic in the sense that functional impulsivity is suggested to be related to attention allocation mechanisms (Dickman, 1993) which seems highly relevant to the driving task. Dickman (1993) emprically showed that functional and dysfunctional impulsivity have different relations to important aspects of cognitive functioning. For instance, it was found that the main effect of functional impulsivity was significant in all the three different calculations of the scores on a cognitive task -sensitive to individual differences in the speed and accuracy of basic perceptual processes-, whereas that of dysfunctional impulsivity was nonsignificant in all the three indicators.

Additional support for the claim that functional and dysfunctional impulsivity are distinct constructs and that this conceptualization should be studied in the driving context comes from the studies using this conceptualization of impulsivity included in this review. For instance, Eensoo et al. (2004) and Eensoo et al. (2005) reported that the driving under the influence and control groups did not significantly differ on functional impulsivity, whereas they differ significantly on dysfunctional impulsivity and impulsivity measured by impulsivity related scales of NEO-PI. In addition, Eensoo et al. (2010) reported a significant odds ratio of fast decision making measure, which is developed based on Dickman's functional impulsivity, for predicting group membership in the speed limit exceeding versus control group. Therefore, the mechanisms through which functional impulsivity and dysfunctional impulsivity affects driver behaviors differentially should be investigated in future studies. This conceptualization may be integrated in the contextual mediated model as shown in Figure 1.2.

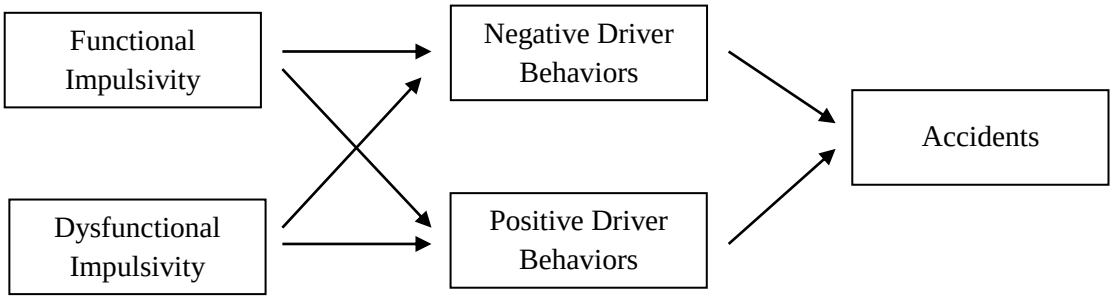


*Figure 1.2*. Contextual mediated model integrating functional and dysfunctional impulsivity and positive and negative driver behaviors (adapted from Lajunen, 1997 and Sümer, 2003).

Functional impulsivity is measured by items such as "I am good at taking advantage of unexpected opportunities, where you have to do something immediately or lose your chance.", "Most of the time, I can put my thoughts into words very rapidly.", "I like sports and games in which you have to choose your next move very quickly.", "I like to take part in really fast-paced conversations, where you don't have much time to think before you speak." (Dickman, 1990), therefore, individuals

scoring high on this scale rates their skill in terms of fast responding as better than average. Hence, it is plausible to expect that they would engage in speeding, for instance, since they believe they can handle it, as evidenced in Eensoo et al. (2010) study. In addition to speeding, they may engage in close-following or overtaking a slow driver on the inside which are other behaviors included in DBQ ordinary violations subscale, because, as "fast-responders" to situations, they think that can do the necessary maneuvers if these behaviors lead to unexpected hazards. However, with regard to the aggressive violations subscale of DBQ, no significant association is expected since expressing anger to other drivers in traffic is related to inhibitory control and functional impulsivity does not tell anything about the inability to control impulsive responses (Reeve, 2007). In addition to violations, positive associations between functional impulsivity and errors and lapses subscales of DBQ can be expected since it is suggested that "... people high in functional impulsivity are more apt to think and respond quickly, and to emphasize speed over certainty of accuracy when the situation requires it." (Reeve, 2007, p. 57). This propensity for sacrificing accuracy for speed may manifest itself in the traffic context as a driving style focused on fast mobility with costs in the form of errors and lapses. Finally, a negative relationship between functional impulsivity and positive driver behaviors can be expected because if the main focus for individuals with high functional impulsivity is speed while completing a task at hand, then we would not expect behaviors that may preclude them from doing so, such as giving their way to other drivers or pedestrians.

Dysfunctional impulsivity is measured by items such as "I often make up my mind without taking the time to consider the situation from all angles.", "Many times the plans I make don't work out because I haven't gone over them carefully enough in advance.", "I often say and do things without considering the consequences." (Dickman, 1990). It can be observed that this conceptualization of dysfunctional impulsivity in Dickman`s functional-dysfunctional distincion is parallel with the general notion of impulsivity in the literature as a maladaptive personality trait and the items are parallel with those of the scales used in the literature to measure impulsivity. Thus, positive associations between dysfunctional impulsivity with aberrant driving behaviors, namely violations (e.g., Berdoulat et al., 2013; González-Iglesias et al., 2012; Wickens et al., 2008), errors (e.g., Owsley et al., 2003; Pearson

et al., 2013) and lapses (e.g.,; Berdoulat et al., 2013; Pearson et al., 2013; ), are expected, as evidenced in the results of the studies included in this review. Finally, with regard to positive driver behaviors, none of the studies included in this review investigated the relationship between impulsivity as a personality trait and positive driver behaviors. However, a negative relationship between dysfunctional impulsivity and positive driver behaviors is expected. Dysfunctional impulsivity is parallel with the general conceptualization of impulsivity as a maladaptive personality trait involving inability to wait and inhibit rapid, error-prone reponses (Reeve, 2007). Thus, it would be plausible to expect that a driver having a high level of dysfunctional impulsivity would be less likely to engage in positive driver behaviors that emphasize a focus on helping and not distrubing other drivers or pedestrians rather than own interest such as fast mobility.

### 1.4.2. An integrative conceptual framework for driving skills/performance

In addition to driving style (i.e., driver behaviors) driving skills are the other important component of human factors in driving (Elander et al., 1993). To better explain the variance in accident involvement, driver skills should also be investigated along with driver behavior. Hence, functional and dysfunctional impulsivity may be investigated in relation to their links with driving skills (see Figure 1.3). Driving skills were first classified as technical and defensive skills by Spolander (1983) and later on Lajunen and Summala (1995) developed the Driver Skill Inventory (DSI) verifying the two-factor structure as perceptual-motor and safety skills. Perceptual-motor skills factor of DSI is assumed to reflect drivers' ratings of their level of skilled and fluent driving; and safety skills factor measures the extent to which the driver sees herself/himself as a safe driver including rule obedience and risk avoidance (Lajunen & Özkan, 2011). Perceptual-motor skills are considered to be based on information processing and motor skills, while safety skills are based on attitudes and personality factors (Martinussen, Moller & Prato, 2014). Hence, it can be expected that perceptual-motor skills would be more strongly related to functional impulsivity than dysfunctional impulsivity, and safety skills would be more strongly related to dysfunctional impulsivity than functional impulsivity. With regard to direction of these relationships, it can be expected that the relationship between

functional impulsivity and perceptual-motor skills in driving would be positive due to the nature of functional impulsivity reflecting a kind of skill involving thinking, acting and speaking rapidly (Reeve, 2007). In addition, it is mentioned above that individuals scoring high on functional impulsivity scale are those who rate their skill level in rapid thinking and acting as being high. Since driving can be regarded as a cognitive and motor task, individuals rating their skills in rapid thinking and acting would reasonably rate their perceptual-motor skills in driving as also being high. On the other hand, a negative relationship between functional impulsivity and safety skills is expected because if these individuals rate their perceptual-motor skills in driving to be high, then they would care for safety to a lower extent, as it has been reported that drivers rating their levels of perceptual-motor skills as high have a riskier driving style and involved in more accidents than drivers who rate their levels of safety skills as high (Lajunen, Corry, Summala & Hartley, 1998; Martinussen et. al., 2014; Sümer, Özkan & Lajunen, 2006). Finally, the relationship between dysfunctional impulsivity and both perceptual-motor and safety skills are expected to be negative. First, as dysfunctional impulsivity resembles the general notion of impulsivity as a maladaptive personality trait in the literature, the impairing effect of this personality trait on performance on cognitive tasks (Dickman, 2000) is expected. As an attempt to explain the performance differences of low and high impulsives on cognitive taks, attentional-fixity theory (Dickman, 1993, 1996) suggests that the attention of high impulsives is relatively easily shifted from its current fixation and because of this tendency, they act with little forethought since they have difficulty in keeping their attention fixed on the decision-making process at hand. Similarly, the theory predicts that high impulsives will have impaired performance on tasks which require them to fix their attention. Therefore, if driving is conceptualized as a cognitive task requiring constant fixing of attention, high dysfunctional impulsivity is expected to be associated with low level of performance on this task. Hence, it can be expected that individuals having higher levels of dysfunctional impulsivity would have lower scores of the perceptual-motor skills subscale of DSI.

With regard to the associations of dysfunctional impulsivity and safety skills, a negative relationship can be expected. Safety skills involve risk avoidance and rule obedience (Lajunen & Özkan, 2011) and measured by items such as “driving behind

a slow car without getting impatient", "conforming to speed limits", and "keeping a sufficient following distance". However, it is evidenced in the literature examining general impulsivity and driving oucomes that impulsivity is associated with risky driving (e.g., Bashoo et al., 2013; Curran et al., 2010; Pedersen & McCarthy, 2008) , rule violations (e.g., Cheng & Lee, 2012; Constantinou et al., 2011) and traffic offences (e.g., O`Brien & Gormley, 2013). Therefore, it can be expected that, dysfunctional impulsivity reflecting the general conceptualization of impulsivity in the literature would be negatively related to safety skills and attitudes.

According to Dickman (1990), however, what differs functional impulsives from dysfunctional impulsives is the consequences of their *impulsive* actions. Hence, with the same level of engagement in speeding, for instance, it would be plausible to expect that functional impulsives achieve a smooth drive thanks to their skill level, while dysfunctional impulsives may get involved in accidents rather than a smooth drive. Therefore, investigation of the differential relations of functional and dysfunctional impulsivity with accident involvement through perceptual-motor and safety skills would be an important step in understanding accident involvement. The proposed integrative models including their assumptions have remained unexamined in literature.

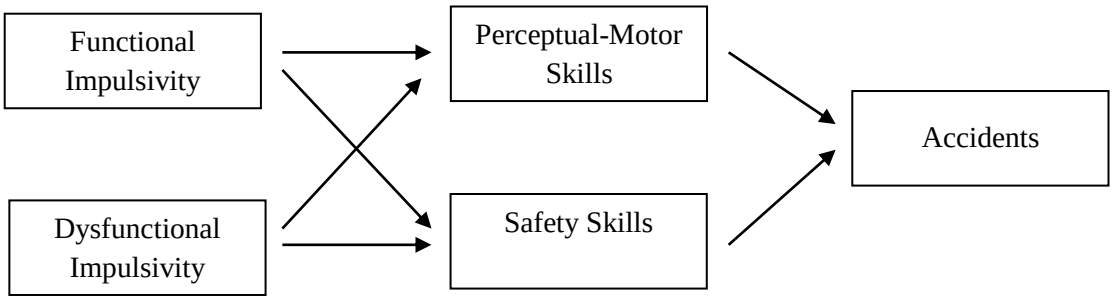


*Figure 1.3*. Contextual mediated model integrating functional and dysfunctional impulsivity and perceptual-motor and safety skills (adapted from Lajunen, 1997 and Sümer, 2003).

### 1.4.3. The 'new' definition and measurement of impulsivity in driving context

Among the studies reviewed, the most commonly used scale to measure impulsivity was the Barratt Impulsiveness Scale version 11 (BIS-11, Patton et al.,

1995). The reason of the common usage of the BIS may be that it includes the three most commonly identified dimensions of impulsivity, namely cognitive (attentional), behavioral (motor) and nonplanning (lack of future orientation). Another commonly used scale was the UPPS (Whiteside & Lynam, 2001), which was also developed via a thorough study with an attempt to integrate all of the conceptualizations and the corresponding scales of impulsivity in the literature. However, as indicated before, it is not possible to claim a discernible pattern of results regarding which dimension of impulsivity is consistently found significantly related and which dimension found nonsignificantly related to driver behavior or anger. For instance, only nonplanning impulsivity dimension of BIS-11 was found to be significantly related to violations in one study (i.e., Constantinou et al., 2011), whereas only positive and negative urgency dimensions of UPPS-P was found significantly associated with violations in another study (i.e., Pearson et al., 2013). However, "nonplanning" dimension of BIS-11 is conceptually similar to the "lack of premeditation" dimension of UPPS (or UPPS-P). This complicates the findings and makes it hard to get a clear picture of the findings. The reason of this complication may be the general lack of consensus on the definition of impulsivity in the literature and the scales that have been developed based on these definitions. In addition, due to significant correlations between the *general* trait of impulsivity and other personality variables used in the studies, impulsivity may not have been found to be significantly related to the driving related outcome measures in the multiple regression analyses because of its shared variance with the other personality measures used in a given study.

Another issue adding to the complication of the nature of impulsivity as a multifaceted construct (Buss & Plomin, 1975; Depue & Collins, 1999; Caswell, Bond, Duka & Morgan, 2015) is that sensation seeking is included in some, but not all conceptualizations of impulsivity utilized in the studies reviewed. Accordingly, some of the various scales used in the studies include subscales measuring sensation seeking (e.g., UPPS; UPPS-P; AMIS) some do not (e.g., BIS-11, Dickman Functional/Dysfunctional Impulsivity Scale). Therefore, regarding the results obtained by using the total score of an impulsivity scale, it should be kept in mind that some of these included sensation seeking, some did not. To clarify this issue to some extent, the coefficients of the relationships between each subscale of a given

impulsivity scale and the driving related outcome were presented when it is available.

Impulsivity and sensation seeking are thought to be distinct constructs. Dahlen et al. (2005) stated that while the former is related to exerting self-control over one`s behaviors and thoughts (Barratt, 1972), the latter is related to the preference for novel experiences and a willingness to take risks to attain those novel experiences (Zuckerman 1979, 1994). In addition, as Steinberg and colleagues (2008) stated, not all the results of impulsivity are rewarding or stimulating experiences such as impulsively deciding to end a friendship, and not all sensation seeking behaviors are done impulsively, such as buying advance tickets to ride a roller coaster. A similar distinction was made by Eysenck (1993) between impulsiveness and venturesomeness. Eysenck (1993) defined impulsiveness as unconscious risk taking and venturesomeness as conscious sensation seeking and claims that both of them may be referred to as impulsivity by lay-people, although they are relatively independent and represent different behaviors. He explains the difference by giving the example of a driver's behavior. If the driver steering the car around a blind bend on the wrong side of the road never considers the danger of this behavior and is really surprized when an accident occurs, this would be related to impulsivity. On the other hand, related to the same behavior example, another driver scoring high on venturesomeness would consider the danger of the situation and consciously decide to take that risk.

At this point, the need for proposing a definition of impulsivity specific to the driving context and developing a scale based on this driving specific definition of impulsivity may be claimed. For instance, Özkan and Lajunen developed the Traffic Locus of Control Scale (2005b) based on the results of studies on locus of control which revealed that the most accurate findings have been achieved by using measures that tailor the construct more specifically to the target behaviors rather than using general measures of locus of control. Driving specific impulsivity can be defined, thus, as the tendency to act quickly and inaccurately or act quickly and accurately without considering and elaborating on the future consequences while driving. Specifically it may involve the inability to wait in traffic; expressing anger and aggression to others while driving; speeding; using cell-phone while driving;

close following; and making sudden accurate or inaccurate maneuvers without considering consequences. Based on this definition, a driving specific impulsivity scale may be developed for studies investigating impulsivity in the traffic context. In addition, this new concept of traffic impulsivity may integrate both functional and dysfunctional aspect of impulsivity and the corresponding scale may be developed in a way that reflects both types of impulsivity in the traffic context. It can also be suggested that a driving specific impulsivity scale should not include a dimension of sensation seeking. This may distort the measurement of the construct of impulsivity as a distinct trait. Finally, the models depicted in Figure 1.2 and Figure 1.3 may be tested by using the driving specific functional and dysfunctional impulsivity scales.

### 1.4.4. Suggestions and Possible Improvements in the Literature

The results of the studies in the present review show that investigating impulsivity as a personality variable in relation to driver behaviors and road traffic accidents is a meaningful effort. In general terms, impulsivity is found to be associated with aberrant driver behaviors, driver anger and aggression, traffic offences and accident involvement. However, it can be argued that relatively less research attention has been given to notion of functional impulsivity, a concept which could be highly relavant to the driving context. In addition, the lack of consensus on the definition of impulsivity is reflected in the number of self-report instruments in the literature to measure this construct. At this point, a new definition of impulsivity specific to the driving context was done. An instrument to measure this driving specific impulsivity construct would also be a valuable contribution to literature. Finally, investigation of impulsivity and driver behavior and road traffic accidents link with populations other than samples of drivers from industrialized countries and samples of university students would be important for the generalizability of the findings. For instance, with regard to the samples of the studies in the present review, the relationship between impulsivity and driver behavior has been investigated among drivers from the USA, Canada, Australia, UK, Austria, Estonia, France, Greece, Ireland, Norway, Spain and China. Hence, studies conducted with samples from different countries and cultures would be valuable. In addition, almost half of the studies in the present review used university student and young samples, and there was only one sudy with

older drivers (57-87 years old), therefore future studies on older drivers will be important to generalize the findings to the whole driver population. In addition, none of the studies investigated the links between impulsivity and driver behaviors with a professional driver sample. This may be another important line of inquiry for future research.

### 1.5. The Aim of the Present Thesis Study

In line with the findings of the literature review and the suggestions for future research based on the synthesis of the literature, the aim of the present thesis study is to first develop a self-report instrument to measure "driving specific impulsivity" which integrates both the dysfunctional and functional aspects of impulsivity in the driving context. The second aim of the current study is to integrate the functional impulsivity conceptualization in the general contextal mediated model. Finally, it is aimed to test the contextual mediated model by using the "driving specific impulsivity" measured by the newly developed scale, and compare the results with the models using general impulsivity as the distal variables in the contextual mediated model to explain accidents and offences in a Turkish driver sample.

# CHAPTER 2

## 2. STUDY 1: Developing the Driving Specific Impulsivity Scales

### 2.1. Aim of the Study

The aim of the present study is to develop an instrument to measure driving specific impulsivity. It was suggested in the introduction section that driving specific impulsivity could be defined as the tendency to act quickly and inaccurately or act quickly and accurately without considering and elaborating on the future consequences while driving. Specifically it may involve the inability to wait in traffic; expressing anger and aggression to others while driving; speeding; using cell-phone while driving; close following; and making sudden accurate or inaccurate maneuvers without considering the consequences. In addition, this new concept of driving specific impulsivity should integrate both functional and dysfunctional aspects of impulsivity and it was suggested in the previous section that the instrument that is designed to assess driving specific impulsivity should be developed in a way that reflects both types of impulsivity in the traffic context. It was also be suggested that a driving specific impulsivity scale should not include a dimension of sensation seeking, since it was discussed that sensation seeking and impulsivity are distinct traits.

To develop this driving specific impulsivity scale, first, the different conceptualizations of general impulsivity in the literature and the scales developed based on these conceptualizations were examined. The common theme in these conceptualizations appeared to be the multi-factor structure of impulsivity. The factors of the most commonly used general impulsivity scales (e.g., Barratt Impulsiveness Scale -BIS; UPPS Impulsive Behavior Scale) in the literature were also more or less reflecting similar basic themes. For instance, the *motor impulsiveness* subscale of BIS composed of items such as “I act on impulse”; “I buy things on impulse”; and “I do things without thinking”; reflecting a general difficulty

in impulse control and acting without thinking. The motor impulsivity factor of BIS is conceptually parallel with the *urgency* subscale of the UPPS Impulsive Behavior Scale which involves items like “I have trouble controlling my impulses”; “I often get involved in things I later wish I could get out of”; and “Sometimes I do things on impulse that I later regret”, again reflecting a difficulty in impulse control and acting without thinking. The second subscale of BIS is *attentional impulsiveness* subscale of BIS involves items like “I don`t pay attention”; “I often have extraneous thoughts when thinking”; and “I concentrate easily” - (reversed item). It can be observed that these items reflect a difficulty in focusing on the task at hand, which is also the common theme in the items of the *lack of perseverance* subscale of the UPPS Impulsive Behavior Scale, such as “I tend to give up easily”; “I finish what I start” – reversed item; and “I concentrate easily”- reversed item. Finally, the *nonplanning impulsiveness* subscale of BIS is composed of items like “I am more interested in the present than future”; “I plan tasks carefully”- reversed item; and “I plan trips well ahead of time” – reversed item; reflecting a lack of future orientation and planning. This is also the case in the items of the *lack of premeditation* subscale of the UPPS Impulsive Behavior Scale, such as “I am not one of those people who blurt out things without thinking” – reversed item; “I am a cautious person.” – reversed item; and “Before I get into a new situation I like to find out what to expect from it” – reversed item.

There is a fourth subscale of the UPPS Impulsive Behavior Scale, sensation seeking. However, as discussed above in detail, sensation seeking and impulsivity are regarded to be distinct traits and therefore, sensation seeking will not be included in the conceptualization of driving specific impulsivity and the scale to be developed to measure this construct.

All of the above listed subscales of BIS and UPPS Impulsive Behavior Scale are reflecting the general dysfunctional conceptualization of impulsivity in the literature. In addition to these three dimensions of impulsivity discussed above, the driving specific impulsivity definition and the scale that will be developed to measure this construct will also include the functional impulsivity conceptualization.

## 2.2. Method

### 2.2.1. The Interview Form

Having examined the general impulsivity literature and decided on the dimensions to be integrated in the driving specific impulsivity scale, semi-structured interview questions were developed. These questions aimed at gathering examples of behaviors in traffic and/or while driving that reflect one of these four dimensions of general impulsivity.

The first question aimed at obtaining examples of difficulty in impulse control (BIS motor impulsiveness / UPPS urgency) while driving: “While you are driving or in traffic, are there any behaviors that you cannot stand displaying, that you cannot postpone, that you feel like doing but also you know that would be wrong or unnecessary?”.

The second question aimed at obtaining examples of lack of future orientation and planning (BIS nonplanning impulsiveness / UPPS lack of premeditation); and difficulty in concentrating on the task at hand (BIS attentional impulsiveness / UPPS lack of perseverance) while driving: “While you are driving or in traffic, are there any behaviors that you display without considering the consequences; or behaviors that you display as automatic responses without thinking over them while doing?”.

The third question aimed at obtaining examples of acting without taking the time to elaborate on the consequences when this is the optimal way of acting (functional impulsivity dimension of Dickman Functional/Dysfunctional Impulsivity Scale) while driving: “While you are driving or in traffic, are there any behaviors that you display immediately without much elaboration in the case of an emergency or danger?”.

After each of these three questions, four additional questions were asked:

- What kind of people/drivers/road users do you think display these behaviors? What kind of characteristics do these people have?
- Why do you think people display these kinds of behaviors?
- What do you think could be the consequences of these kinds of behaviors?/ When you display these kinds of behaviors, what kind of consequences did you experience?

The aim of asking these questions is first to probe and help the interviewee remember more instances. In addition, the aim of asking the consequences would help specifying the examples and formatting them in the scale item format. Finally, by using the characteristics that the interviewees used to define "those kinds of drivers/road users" that display the types of behaviors asked, an impulsive driver scale based on adjectives will be developed.

Finally, at the end of the interview, the respondents were asked two general questions; one asking examples of situations that they have displayed one of or all types of behaviors asked in the interview and experienced a negative consequence; and the other one asking the same question for a positive consequence. These final two questions were asked in a way to gather examples of general dysfunctional and functional impulsivity in the driving context which are distinguished by the consequences by Dickman`s definition (1990). The semi-structured interview form used in the interviews is presented in Appendix 1.

### 2.2.2. Participants

Twenty interviews were conducted to gather as much behavioral examples as possible that could be used as items of the driving specific impulsive behavior scale; and as much characteristics as possible to be used as items of the driving impulsivity scale based on adjectives.

A convenience sampling approach was utilized and the participants were recruited by the help of acquaintances. The ages of the participants ranged between 21 and 75 years ($M$ = 33.5, $SD$ = 11.51); and seven of them were women (35%). Four participants were professional taxi drivers, who had the highest total mileage. The total mileage of the participants ranged between 200 km and 1800000km. There was only one participant who had been driving for only three months at the time of the interview (total mileage 200 km), who was also the youngest participant (21 years). The researcher is aware of the fact that this participant cannot be counted as a "driver". However, this participant was interviewed for the sample to include at least one very inexperienced driver. The most inexperienced driver if this participant was excluded from the sample had a total mileage of 5000 km with two years of driving experience. Age, gender, occupation, years of being experience as a "driver"; annual

mileage; and total mileage information of the 20 participants are presented in Table 2.1.

**Table 2.1. Information on Interviewee Characteristics**

| No | Age | Gender | Occupation | Driving Experience (in years) | Annual Mileage (km) | Total Mileage (km) |
|---|---|---|---|---|---|---|
| **1** | 30 | Woman | Lawyer | 12 | 20000-25000 | 240000-300000 |
| **2** | 29 | Man | Lawyer | 11 | 5000-10000 | 55000-110000 |
| **3** | 51 | Man | Taxi Driver | 33 | 80000 | 800000 |
| **4** | 34 | Man | Clerk | 6 | 1000-1200 | 6000-7000 |
| **5** | 30 | Woman | Manager/Owner | 5 | 20000 | 100000 |
| **6** | 30 | Man | Taxi Driver | 9 | 50000 | 500000 |
| | | | | | | |
| **7** | 35 | Man | Taxi Driver | 17 | 70000 | 840000 |
| **8** | 34 | Man | Research assistant (Psychology) | 3.5 | 10000 | 35000 |
| **9** | 21 | Woman | Student | 0.25 | 200 | 200 |
| **10** | 28 | Man | Research assistant (Economy) | 9 | 20000 | 180000 |
| **11** | 27 | Woman | Research assistant (Economy) | 5 | 10000-12000 | 60000 |
| **12** | 30 | Man | Research Assistant (Biomedical Engineering) | 11 | 10000 | 110000-120000 |
| **13** | 33 | Woman | Research assistant (Psychology) | 3 | 3600 | 11000 |
| **14** | 30 | Man | Civil Engineer | 12 | 10000 | 120000 |
| **15** | 32 | Man | Government Officer | 14 | 4000-5000 | 40000 |

| No | Age | Gender | Occupation | Driving Experience (in years) | Annual Mileage (km) | Total Mileage (km) |
|---|---|---|---|---|---|---|
| **16** | 75 | Man | Professor (Emeritus) | 53 | 10000 | 450000 |
| **17** | 29 | Woman | Psychologist | 3 | 15000 | 55000 |
| **18** | 40 | Man | Taxi Driver | 22 | 120000 | 1800000 |
| **19** | 26 | Man | Research assistant (Psychology) | 2 | 2500 | 5000 |
| **20** | 26 | Woman | Research assistant (Psychology) | 1.5 | 7200 | 15000 |

### 2.3. Results

All of the interviews were recorded by getting the permission of the interviewees and then transcribed. The transcriptions made up a total of 100 pages of single spaced material to be analyzed. For the analysis, first, each behavioral example and corresponding characteristic (i.e., the answer to the question "what kind of people do you think display such behavior") to each question by each participant were listed in the spreadsheet format. For instance, in the first column, the behavioral examples given while answering the first question (i.e., While you are driving or in traffic, are there any behaviors that you cannot stand displaying, that you cannot postpone, that you feel like doing but also you know that would be wrong or unnecessary?") were listed. In the next column, the characteristics or adjectives that the interviewee listed in response to the probe question of "What kind of people/drivers/road users do you think display these behaviors? What kind of characteristics do you think these people have?". Then, in the next column, the behavioral examples given while answering the second question (i.e., "While you are driving or in traffic, are there any behaviors that you display without considering the consequences; or behaviors that you display as automatic responses without thinking over them while doing?") were listed; and in the column next to this one, the characteristics or adjectives that the interviewee listed in response to the probe question of "what kind of people do you think display these kinds of behaviors?" were written down. The same procedure was applied for the third question and the final two general questions too. In this spreadsheet, the behavioral examples were in phrase format, not in full sentences (e.g., "Answering a

call"; "Shouting at other drivers"; "Changing the lane rapidly"). Then, the behavioral examples listed by all the interviewees were clustered together according to the question they were listed for, which in general reflects the dimension of impulsivity they would be used as items to measure. The same procedure was applied for the adjectives. After grouping the behavioral examples and adjectives according to the impulsivity dimension, they were counted. For each behavioral example and for each adjective, the frequencies (the number of interviewees having mentioned that behavioral example or that adjective) and counts (the number of times each behavioral example and each adjective were mentioned in total) were determined. The behavioral examples were listed in descending order of frequencies basically, and if there were items with the same frequency, the counts were considered. These listings were made for every impulsivity dimension independently. The same procedure of listing was made for the adjectives. From these lists of behavioral examples and adjectives in descending order of frequencies, the top 10-15 items were selected to be included in the driving specific impulsive behavior and driver impulsivity personality scales respectively. In both of the list of the behavioral examples and the list of the adjectives, items in the lack of perseverance (or attentional impulsiveness) dimension were much fewer than the other dimensions (three items in the adjectives list and nine items in the behavioral examples list). Therefore, no selection procedure was applied to these items; all of the items were included in the corresponding scales. The final behavioral example list and the adjectives list are presented in Table 2.2 and Table 2.3 respectively along with the frequency and count values of each item and the corresponding impulsivity dimension.

**Table 2.2. List of behavioral examples extracted from the interviews to be converted into items of the Impulsive Driver Behavior Scale**

| Frequency | Count | Behavioral Example | Impulsivity Dimension |
|---|---|---|---|
| 13 | 18 | Speeding (Hız yapmak) | Urgency |
| 8 | 11 | Occupied with telephone; answering calls, reading messages Telefonla uğraşmak; | Urgency |

| | | | |
|---|---|---|---|
| | | telefona cevap vermek, mesajlara bakmak) | |
| 7 | 7 | Becoming angry with other drivers (Başka sürücülere sinirlenmek) | Urgency |
| 5 | 5 | Being impatient while driving despite having no hurry (Hiç acelesi olmasa bile trafikte sabırsız olmak | Urgency |
| 4 | 6 | Rushing in traffic although not being late for anything (Gecikmek gibi bir sorunum olmasa da acele hareket etmek) | Urgency |
| 4 | 5 | Shouting at other drivers (Başka sürücülere bağırmak) | Urgency |
| 4 | 4 | Sounding horn when it is unnecessary (Gereksiz korna çalmak) | Urgency |
| 3 | 3 | Swearing to other drivers without leaving the car (Aracın içinden başka araç sürücülerine küfretmek) | Urgency |
| 3 | 3 | Leaving the car to fight with other drivers or pedestrians (Arabadan inip diğer araç sürücüleri veya yayalarla kavga etmek) | Urgency |
| 3 | 5 | Trying to overtake the car in front despite having no hurry (Acelem olmadığı halde önümdeki araç yavaşsa geçmeye çalışmak) | Urgency |
| 3 | 3 | Getting angrey with the driver of the vehicle in front and making gestures (Önümdeki aracın sürücüne sinirlenip el kol hareketi yapmak) | Urgency |
| 3 | 3 | Getting angry with the driver of the vehicle in front and sounding horn (Önümdeki araç sürücüsüne sinirlenip kornaya basmak) | Urgency |
| 3 | 3 | Stepping on the gas not to wait if there is a short time for the light to turn red (Kırmızı ışığın yanmasına çok az varsa ışıkta kalmamak için gaza basmak) | Urgency |
| 3 | 3 | Starting the car up very fast (Arabayı hızlı kaldırmak) | Urgency |
| 9 | 12 | Signaling although there is no vehicle behind (Arkamdan gelen kimse olmasa bile sinyal vermek) | Lack of premeditation - Reversed |
| 4 | 4 | Continuously elaborating on what other drivers will do (Karşı tarafın ne yapacağını sürekli hesap etmek) | Lack of premeditation - Reversed |
| 3 | 4 | Driving cautiously (Temkinli araba sürmek) | Lack of premeditation - Reversed |
| 3 | 4 | Obeying the rules (Kurallara uymak) | Lack of premeditation - Reversed |
| 3 | 6 | Continuously checking the left-right and the rear-front views (Sağa-sola, arkaya-öne sürekli bakarak kontrol etmek) | Lack of premeditation - Reversed |

| | | | |
|---|---|---|---|
| 3 | 4 | Checking if the vehicle behind has enough breaking distance while stopping or slowing down (Duracağım veya yavaşlayacağım zaman arkadan gelen arabanın yeterli fren mesafesi olup olmadığını da kontrol etmek) | Lack of premeditation - Reversed |
| 3 | 3 | Avoiding behaviors that may impose a threat on safety (Güvenlik zaafiyeti oluşturabilecek davranışlardan kaçınmak) | Lack of premeditation - Reversed |
| 2 | 2 | Fastening seat belt (Emniyet kemerini takmak) | Lack of premeditation - Reversed |
| 2 | 2 | Diving according to the weather conditions (Hava şartlarına dikkat ederek sürmek) | Lack of premeditation - Reversed |
| 1 | 1 | Slowing down while approaching the traffic lights (Işıklara yaklaşırken yavaşlamak) | Lack of premeditation - Reversed |
| 1 | 1 | Not speeding on narrow roads (Dar yollarda hız yapmamak) | Lack of premeditation - Reversed |
| 1 | 1 | Considering and premeditating everything while driving e.g., I would pass to the right lane 200 m before the junction if I will turn right (Herşeyi düşünerek önceden planlayarak sürmek;`kavşakta sağa döneceksem kavşağa 200 m kala sağ şeride geçerim`) | Lack of premeditation - Reversed |
| 5 | 8 | Paying attention (Dikkat etmek) | Lack of perseverance - Reversed |
| 3 | 5 | While driving, I am preoccupied with the tasks that I have to complete; being absent-minded (Araba sürerken aklıma yapmam gereken işler geliyor; zihni başka seyle mesgul olmak, dalgın olmak) | Lack of perseverance |
| 2 | 2 | Watching other people and vehicles instead of looking at the headway road (Yola bakmak yerine çevredeki insanlara ve arabalara bakmak) | Lack of perseverance |
| 2 | 2 | Heading to an everyday destination instead of the one intended due to musing (Dalıp gitmem gereken yere değil de normalde sürekli gidilen yere gitmek) | Lack of perseverance |
| 2 | 2 | In a case of emergency, I may be taken unawares if I have a lot on my mind" ("Tehlike anında kafam çok doluysa boş bulunabilirim") | Lack of perseverance |
| 1 | 1 | "I may be distracted by the music" ("Müziğe eşlik edip dikkatim dağılabilir") | Lack of perseverance |
| 1 | 1 | Although the traffic signs have changed, I obey the old ones due to inattention" | Lack of perseverance |

| | | | |
|---|---|---|---|
| | | (“Trafik işaretleri değişmiş olsa bile ben dikkat etmediğimden eski kural neyse onu uyguluyorum”) | |
| 1 | 1 | Forgetting to set the parking brake before stopping in traffic (Trafikte akış esnasında durunca el frenini çekmeyi unutmak) | Lack of perseverance |
| 1 | 1 | Entering the wrong toll booth lane due to an automatic behavior (Otoyolda giderken otomatik olarak OGS gişesine girmek) | Lack of perseverance |
| 9 | 9 | Stopping after rapidly checking the sides in the case of an emergency (Tehlike anında hızla etrafı kontrol ederek durmak) | Functional impulsivity |
| 7 | 7 | Checking the rear mirror before emergency breaking if something suddenly comes in my way (Önüme ani birşey çıktığında ani fren yapmadan hemen dikiz aynasından arkayı kontrol etmek) | Functional impulsivity |
| 5 | 5 | Running away by strong reflexive behavior in the case of an emergency (Tehlike anında kuvvetli refleks göstererek kaçmak) | Functional impulsivity |
| 6 | 6 | Sudden lane changing without checking the sides in the case of an emergency (Tehlike anında etrafa hiç bakmadan ani şerit değiştirmek) | Functional impulsivity - Reversed |
| 4 | 7 | Turning the wheel hard without checking the sides in a case of a nearmiss (Birşeyle burun buruna gelince etrafa bakmadan direksiyonu kırmak) | Functional impulsivity - Reversed |
| 3 | 4 | Manoeuvering after rapidly checking the right and left sides in the case of an emergency (Tehlike anında sağa sola hızlıca bakıp kontrol ederek manevra yapmak) | Functional impulsivity |
| 3 | 4 | Manoeuvering after rapidly elaborating on the speed and the road conditions in the case of an emergency (Tehlike anında kendi hızını ve yolun durumunu hızlıca gözden gecirip uygunsa manevra yapmak) | Functional impulsivity |
| 2 | 3 | Rapidly checking the environment to find a safe spot to run away while slowing down in the case of an emergency (Tehlike anında yavaşlarken bir yandan da hızlıca çevreyi kontrol ederek sakin güvenli kacacak bir yer bulmaya çalışmak) | Functional impulsivity |
| 2 | 2 | Staying calm in the case of an emergency (Tehlike anında panik yapmamak) | Functional impulsivity |
| 2 | 2 | Recognizing if something wrong on your way ahead and immediately turning the flashers on to warn other drivers to slow down (Yolun ilerisindeki bir kaza durumunu fark edip hemen dörtlüleri yakarak gelen araçların yavaşlamasını sağlamak) | Functional impulsivity |

| | | | |
|---|---|---|---|
| 2 | 2 | Accelerating to run away from a vehicle than is about to come on my way (Önüme kıran bir araca çarpmamak için hızlanarak kaçmak) | Functional impulsivity |
| 1 | 1 | Determining an empty sport to run away very quickly in a situation that may end up as a collision otherwise (Kaza olabilecek bir durumda kurtarmak için en boş yer neresi çok hızlı görüp oraya kaçmak) | Functional impulsivity |
| 1 | 1 | Being able to decide very quickly in emergency situations (Tehlike anında hızlı karar verebilmek) | Functional impulsivity |
| 1 | 1 | Being able to act fast in emergency situations (Tehlike anında seri hareketler yapabilmek) | Functional impulsivity |
| 1 | 1 | Being able to respond properly in emergency situations (Tehlike anında iyi tepkiler verebilmek) | Functional impulsivity |

As mentioned above, these behavioral examples in the list presented in Table 2 are not in the form of scale items. These examples were converted into scale items by the researcher in a way that each item will have a full sentence structure with the subject of "I". In addition, phrases like "while driving" or "while in traffic" were added to these examples, if it was necessary to define these situations. Similarly, in most of the examples of the urgency dimension, phrases like "although I know that it is unnecessary" or "although I know that I should not do so" were added to strengthen the difficulty of impulse control feature of the urgency dimension. The urgency dimension examples were the ones which were gathered by the interview question of "While you are driving or in traffic, are there any behaviors that you cannot stand displaying, that you cannot postpone, that you feel like doing but also you know that would be wrong or unnecessary?". The final version of the scale items are presented in Appendix.

**Table 2.3. The adjective list extracted from the interviews to be used in the Impulsive Driver Scale**

| Frequency | Count | Adjective | Impulsivity Dimension |
|---|---|---|---|
| 5 | 5 | Impatient (Sabırsız) | Urgency |
| 5 | 5 | Angry (Sinirli ) | Urgency |
| 4 | 4 | Aggressive (Agresif) | Urgency |
| 2 | 2 | Stressgul (Stresli) | Urgency |
| 1 | 2 | Tense (Gergin) | Urgency |
| 1 | 1 | Intolerant (Tahammülsüz) | Urgency |
| 3 | 3 | Hasty (Aceleci) | Urgency |
| 6 | 7 | Insensible (Bilinçsiz) | Urgency |
| 2 | 4 | Selfish (Bencil ) | Urgency |
| 2 | 3 | Insensitive (Duyarsiz) | Urgency |
| 4 | 7 | Not having self-control (Kendini kontrol edemeyen) | Urgency |
| 1 | 2 | Impulsıve (Dürtüsel) | Urgency |
| 1 | 1 | Reactive (Tepkisel) | Urgency |
| 4 | 5 | Careless (Umursamaz) | Lack of premeditation |
| 3 | 3 | Irresponsible (Sorumsuz) | Lack of premeditation |
| 3 | 4 | Thoughtless (Düşüncesiz) | Lack of premeditation |
| 1 | 2 | Incautious (Temkinsiz) | Lack of premeditation |
| 1 | 1 | Carefree (Vurdumduymaz ) | Lack of premeditation |
| 1 | 1 | Light-hearted (Gamsız) | Lack of premeditation |
| 1 | 1 | Heedful (Garantici) | Lack of premeditation - Reversed |
| 7 | 9 | Inattentive (Dikkatsiz ) | Lack of perseverance |
| 7 | 8 | Preoccupied (Zihni meşgul ) | Lack of perseverance |
| 4 | 4 | Absent-minded (Dalgın) | Lack of perseverance |
| 9 | 11 | Experienced (Deneyimli ) | Functional impulsiviy |
| 5 | 6 | Panic (Panik) | Functional impulsivity - Reversed |
| 4 | 7 | Novice (Acemi) | Functional impulsivity - Reversed |
| 4 | 4 | Excited (Heyecanlı) | Functional |

| | | | |
|---|---|---|---|
| | | | impulsivity - Reversed |
| 3 | 4 | Having strong reflex (Refleksleri kuvvetli) | Functional impulsiviy |
| 2 | 2 | Calm (Soğukkanlı ) | Functional impulsiviy |
| 2 | 2 | Having a quick mind (Kafasi hızlı çalışan) | Functional impulsiviy |
| 1 | 1 | Overhasty (Tezcanlı) | Functional impulsiviy |
| 1 | 1 | Alert (Tetikte) | Functional impulsiviy |
| 1 | 1 | Smart (Zeki) | Functional impulsiviy |
| 1 | 1 | Skilful (Becerikli) | Functional impulsiviy |
| 1 | 1 | Strong hand-arm-foot coordination (El-kol-ayak koordinasyonu güçlü olan) | Functional impulsiviy |
| 1 | 1 | High cognitive capacity (Bilişsel kapasitesi yüksek olan) | Functional impulsiviy |
| 1 | 1 | Highly perceptive (Algısı yüksek olan) | Functional impulsiviy |
| 1 | 1 | Anxious (Telaşlı) | Functional impulsivity - Reversed |
| 1 | 1 | Witty (Hazırcevap ) | Functional impulsiviy |
| 1 | 1 | Restless (Hareketli ) | Functional impulsiviy |

# CHAPTER 3

## 3. STUDY 2: Testing the Psychometric Properties of the Newly Deveopled Scalesand the Proposed Associations

## METHOD

### 3.1.Participants

Convenience sampling with snowball technique was used to reach "drivers" to fill out the questionnaire form. The announcement of the study along with the link to the online version of the questionnaire package was posted to social media websites, using many different accounts of people who volunteered to help distribute the survey. In addition, the paper-pencil version of the questionnaire package were distributed to acquaintances who are "drivers" and also these acquaintances distributed the questionnaire package to those in their immediate social environment who are also "drivers". A total of 676 drivers filled out the questionnaire package; 167 (24.7 %) filled out the paper-pencil version and 509 (75.3 %) filled out the online version. However, 170 cases were eliminated from the data, since the total mileage of these participants were lower than 3000 km. The final sample size was 506, 348 (68.8 %) of whom completed the online version, and 158 (31.2 %) filled out the paper-pencil version of the questionnaire package. In terms of gender distribution, 32.6 % of the sample were women ($N$ = 165) and 67.4 % were men ($N$ = 341). Ages of the participants ranged between 19 and 76 with a mean of 33.87 years ($SD$ = 11.72). Education level of the participants ranged between primary school graduate ($N$ = 6; 1.2 %) to holding a PhD ($N$ = 33, 6.5 %). The average number of years having a driver licence was 13.05 years ($SD$ = 10.16), ranging from 1 year ($N$ = 16; 3.2 %) to 47 years ($N$ = 2; 0.4 %). Total mileage reported by the participants ranged between 3000 km ($N$ = 10; 2 %) to 2500000 km ($N$ = 1; 0.2 %), with a mean of 159612.65 km ($SD$ = 498326.61).

**Table 3.1. Age and education level of the participants**

| Age (years) | F | % | Education Level | F | % |
|---|---|---|---|---|---|
| 19-25 | 145 | 28.7 | Primary School | 6 | 1.2 |
| 26-30 | 110 | 21.7 | Secondary School | 3 | 0.6 |
| 31-35 | 85 | 16.8 | High School | 38 | 7.5 |
| 36-40 | 40 | 7.9 | Vocational School | 20 | 4.0 |
| 41-45 | 21 | 4.2 | University | 293 | 57.9 |
| 46-50 | 29 | 5.7 | Master`s Degree | 107 | 21.1 |
| **Age (years)** | **F** | **%** | **Education Level** | **F** | **%** |
| 51-55 | 45 | 8.9 | PhD | 33 | 6.5 |
| 56-60 | 18 | 3.6 | Missing | 6 | 1.2 |
| 61-65 | 7 | 1.4 | | | |
| 66-70 | 3 | 0.6 | | | |
| 71-76 | 1 | 0.2 | | | |
| Missing | 2 | 0.4 | | | |

**Table 3.2. Total mileage and years of having a driving licence reported by the participants**

| Total Mileage (in km) | F | % | Years of Having a Driving Licence | F | % |
|---|---|---|---|---|---|
| 3000-10000 | 98 | 19.4 | 1-5 | 152 | 30.0 |
| 11000-50000 | 159 | 31.4 | 5.5-10 | 114 | 22.5 |
| 51000-100000 | 84 | 16.6 | 11-15 | 82 | 16.2 |
| 110000-200000 | 69 | 13.6 | 16-20 | 43 | 8.5 |
| 210000-300000 | 33 | 6.5 | 21-25 | 32 | 6.3 |
| 310000-400000 | 23 | 4.5 | 26-30 | 55 | 10.9 |
| 410000-500000 | 13 | 2.6 | 31-35 | 12 | 2.4 |
| 510000-1000000 | 20 | 4.0 | 36-40 | 11 | 2.2 |
| 1500000-2500000 | 3 | 0.6 | 41-47 | 5 | 1.0 |
| Missing | 4 | 0.8 | Missing | 0 | 0 |

**Table 3.3. City lived in reported by the participants**

| City | F | % | City | F | % |
|---|---|---|---|---|---|
| Ankara | 323 | 63.8 | Edirne | 2 | 0.4 |
| Adana | 71 | 14.0 | Isparta | 2 | 0.4 |
| İstanbul | 40 | 7.9 | Aydın | 1 | 0.2 |
| İzmir | 16 | 3.2 | Burdur | 1 | 0.2 |
| Antalya | 6 | 1.2 | Diyarbakır | 1 | 0.2 |
| Bursa | 6 | 1.2 | Gaziantep | 1 | 0.2 |
| Konya | 5 | 1.0 | Kahramanmaraş | 1 | 0.2 |
| Balıkesir | 3 | 0.6 | Kütahya | 1 | 0.2 |
| Eskişehir | 3 | 0.6 | Lekfoşa | 1 | 0.2 |
| Girne | 3 | 0.6 | Manisa | 1 | 0.2 |
| Mersin | 3 | 1.4 | Muş | 1 | 0.2 |
| Muğla | 3 | 1.4 | Sakarya | 1 | 0.2 |
| Samsun | 3 | 1.4 | Sanlıurfa | 1 | 0.2 |
| Denizli | 2 | 0.4 | Missing | 4 | 0.8 |

### 3.2. Instruments

The questionnaire package filled out by the participants was composed of eight sections. The first section included demographic and driving related information. The following seven sections were the self-report scales.

#### 3.2.1. Demographic and Driver Information Form

In this section age, gender, education level, years of having a driving licence, the previous year`s mileage and total mileage information was gathered. In addition, the frequency of driving in different conditions, namely in winter season, in heavy traffic; highways; other main roads; in urban roads; in intercity roads; and in every situation in general was asked with a five-point scale having anchors of 1) every day, 2) once in a week, 3) twice a month, 4) once in a month, and 5) once in six months. Moreover, number of accidents in the last three years; number of parking tickets, number of tickets for improper passing, exceeding the speed limits in urban and in intercity roads, red light running, drinking and driving and other reasons; the speed preference in urban and intercity roads, and the ratio if overtaking frequency to being overtaken in traffic were asked.

### 3.2.2. Barratt Impulsiveness Scale Short Form (BIS-11-SF)

The 30-item Barratt Impulsiveness Scale version 11 (BIS-11) was developed by Patton et al. (1995). Tamam, Gulec and Karatas (2013) adapted the shortened version by factor analyzing the items of the scale and taking the five items with the highest loadings for each of the subscales, namely motor impulsiveness, attentional impulsiveness and nonplanning impulsivess. The internal consistency reliability coefficients (Cronbach`s Alpha) were .70 for motor impulsiveness, .64 for attentional impulsiveness, .80 for nonplanning impulsiveness; and .82 for the total 15-item scale in the adaptation study. In the present study, the internal consistency reliability coefficients were .68 for motor impulsiveness, .77 for attentional impulsiveness, .78 for nonplanning impulsiveness; and .86 for the total 15-item scale. The items require responding on a four-point scale (1= never/rarely; 2= sometimes; 3= often; 4= almost always/always) and higher scores indicate higher levels of impulsivity.

### 3.2.3. UPPS Impulsive Behavior Scale

Urgency Premeditation Perseverance Sensation Seeking (UPPS) Impulsive Behavior Scale was developed by Whiteside and Lynam (2001) and the Turkish version of the scale was adapted by Yargic, Ersoy and Oflaz (2011). In the adaptation study, internal consistency reliability coefficients of the subscales were found to be .80 for urgency, .86 for lack of premeditation, .80 for lack of perseverance, .86 for sensation seeking and .81 for the total scale. In the present study, internal consistency reliability coefficients of the subscales were .83 for urgency, .89 for lack of premeditation, .79 for lack of perseverance, .87 for sensation seeking and .90 for the total scale. The items require responding on a four-point scale (1= does not apply to me at all – "*bana hic uymuyor*"; 4= applies to me strongly – "*bana cok uyuyor*") and higher scores indicated higher levels of impulsive behavior.

### 3.2.4. Driver Behavior Questionnaire (DBQ)

The 28-item Driver Behavior Questionnaire developed by Reason et al. (1990) and adapted to Turkish by Sümer, Lajunen and Özkan (2002); and Sümer and Özkan (2002) was used. DBQ measures aberrant driver behaviors namely ordinary violations, aggressive violations, errors and lapses. In addition to aberrant driver behaviors, the 14-item DBQ positive behaviors scale was developed by Özkan and

Lajunen (2005) to measure positive driver behaviors; and this scale was also used in the present study. The items required responding on a six-point scale (0 = never; 5 = always) and higher scores indicate higher levels of the given behaviors. In the present study, the internal consistency reliability coefficients of the subscales were found to be .80 for ordinary violations, .68 for aggressive violations, .83 for violations (total violations), .74 for errors, .75 for lapses and .77 for positive behaviors.

### 3.2.5. Driver Skill Inventory (DSI)

The 20-item Driver Skill Inventory developed by Lajunen and Summala (1995) and adapted to Turkish by Lajunen and Özkan (2004) was used. The two subscales of the DSI measures perceptual-motor skills and safety skills. The items require responding on a five-point scale by considering how they rate themselves on each skill (0 = very weak; 4= very strong) and higher scores indicate higher level of skills. In the present study, the internal consistency reliability coefficients of the subscales were found to be .85 for perceptual-motor skills, and .77 for safety skills.

### 3.2.6. Dickman Functional/Dysfunctional Impulsivity Scale

Dickman (1990) conceptualized impulsivity as functional and dysfunctional; and developed a total 23-item scale to measure these constructs; 11 items measuring functional impulsivity and 12 items measuring dysfunctional impulsivity. In the scale development study by Dickman (1990), internal consistency reliability coefficient of functional impulsivity subscale was .74 and that of dysfunctional impulsivity was .85. The items of this scale were translated into Turkish by two independent Psychology PhD students; and after that, the wordings of the items were finalized by the researcher and the supervisor of the present thesis. The items required responding on a four-point scale (1: does not apply to me at all – "*bana hic uymuyor*"; 4: applies to me strongly – "*bana cok uyuyor*") and higher scores indicated higher levels of functional and dysfunctional impulsivity. Factor analysis results and internal consistency reliability coefficients of the Turkish adaptation of the scale are presented in the Result section of the present thesis study.

### 3.2.7. Impulsive Driver Behavior Scale

The 49 items of the Impulsive Driver Behavior Scale developed in the first study of the present thesis were used to measure both functional and dysfunctional impulsive behaviors while driving and/or in traffic. The participants were instructed to rate each item by considering how much each item reflects their behaviors while driving and/or in traffic. The items required responding on a five-point scale (1: does not reflect me at all; 2: in general does not reflect me; 3: neither does reflect nor does not reflect me; 4: reflects me in general; 5: reflects me completely) and higher scores indicated higher levels of driving specific impulsive behavior. Factor analysis results and internal consistency reliability coefficients of the subscales are presented in the Result section of the present thesis study.

### 3.2.8. Impulsive Driver Scale

The 40 items of the Impulsive Driver Scale composed of adjectives extracted from the interviews conducted in the first study of the present thesis were used to measure both functional and dysfunctional impulsivity while driving and/or in traffic. The participants were instructed to rate each item by considering how much each item reflects themselves as drivers in traffic. The items required responding on a five-point scale (1: does not reflect me at all; 2: in general does not reflect me; 3: neither does reflect nor does not reflect me; 4: reflects me in general; 5: reflects me completely) and higher scores indicated higher levels of driving specific impulsivity. Factor analysis results and internal consistency reliability coefficients of the subscales are presented in the Result section of the present thesis study.

# CHAPTER 4

# 4. STUDY 2 – RESULTS

## 4. 1. Factor Analyses on the Newly Developed and Adapted Scales

### 4.1.1. Impulsive Driver Behavior Scale

A factor analysis using principal component analysis as the extraction method was conducted on the 49 items of the Impulsive Driver Behavior Scale developed in the first study. An oblique rotation method, Direct Oblimin was used, since the correlations among components reached and exceeded .30. The Kaiser-Meyer-Olkin Measure of sampling adequacy was .901 and the Bartlett's test of sphericity was significant (df= 1176, $p < .001$) which shows that the correlation matrix produced by the items is factorable. Using the percentage of variance accounted for by the factors as the criterion to decide on the number of factors (40 % was set as the cutoff) mentioned in Reise, Comrey and Waller (2000) and by observation of the the scree plot, the number of factors extracted was four in the final analysis.

The first factor ($\alpha$ = .90) was composed of 13 items and the communalities of these items ranged between .169 and .674. This factor was labeled as "driver functional impulsivity" as the potential marker item having the highest communality in this factor was "I can make up my mind very quickly in an emergency" (Tehlike aninda hizli karar verebilirim).

The second factor ($\alpha$ = .86) was composed of 11 items and the communalities of these items ranged between .295 and .640. This factor was labeled as "driver urgency" as the potential marker item having the highest communality in this factor was "Although I have no hurry, I am impatient while driving" (Hiç acelem olmasa bile araç kullanırken sabırsız davranırım).

The third factor ($\alpha$ = .83) was composed of 10 items and the communalities of these items ranged between .269 and .546. This factor was labeled as "driver lack of

premeditation" as the potential marker item having the highest communality in this factor was "I avoid behaviors that may generate potential risks while I am driving"-revesed item (Araç kullanırken güvenlik zaafiyeti oluşturabilecek davranışlardan kaçınırım).

The fourth factor ($\alpha$ = .75) was composed of 8 items and the communalities of these items ranged between .235 and .560. This factor was labeled as "driver lack of perseverance" as the potential marker item having the highest communality in this factor was "I may not act adequately in an emergency due to absence of mind" (Araç kullanırken tehlike anında dalgınlık nedeniyle boş bulunabilirim).

A total of seven items were dropped in the final analysis. Two of these dropped items were written for the driver premeditation factor, but they loaded on the first factor (driver functional impulsivity). These items were "Duracağım veya yavaşlayacağım zaman arkadan gelen aracın yeterli fren mesafesi olup olmadığını kontrol ederim" and "Araç kullanırken karşı tarafın ne yapacağını sürekli hesap ederim" which fit the general content of the items in the functional impulsivity factor reflecting a constant monitoring process and alertness about the traffic environment in a given moment, which may be the reason of these items loading on this factor. However, these items do not reflect the *rapid* nature of this process that is present in the items of the first factor (driver functional impulsivity) and which is an important aspect of the functional impulsivity concept in general as it is suggested that functional impulsivity is associated with thinking and responding quickly, and preferring speed over accuracy when the situation requires it (Reeve, 2007). Therefore, these two items were not included in the first factor (driver functional impulsivity). Since they did not load on the intended factor, that is, premeditation factor of impulsive driving, these items were dropped.

One item ("Tehlikeli olduğunu düşündüğüm halde seyir halindeyken telefona cevap verir veya gelen mesajlara bakarım") was dropped because this item had crossloadings lower than .30 (i.e., .268, .280 and -.252) from the first factor (driver functional impulsivity), the second factor (driver urgency) and the third factor (driver lack of premeditation ) respectively, which may mean that the item was not perceived by the respondents as it was intended to be by the researcher.

Another item (“Arac kullanirken surekli dikkat ederim”) was dropped because this one did not load on the fourth factor (driver lack of perseverance), which was the intended factor and it also had crossloadings from the first factor (driver functional impulsivity) and the third factor (driver lack of premeditation) with similar values (i.e., -.319 and -.438 respectively). The reason of this may be that the item may be perceived by the respondents as being related to the alertness concept of functional impulsivity; and driving in a precautious way concept of driver lack of premeditation. All in all, it did not reflect the intended factor of lack of perseverance factor of driver impulsive behavior, therefore it was dropped.

Another item was dropped (“Önüme kıran bir araca çarpmamak için hızlanırım”) because it was intended to be in the first factor (driver functional impulsivity), but it loaded on the fourth factor (driver lack of perseverance) with a rather low value of .334. The respondents may have perceived this item to be related to attention mechanisms while driving. In addition, the wording of the item may have been problematic in a way that it does not reflect the functional impulsivity concept`s rapid thinking and acting. The main theme in this item was that the driver realizes a vehicle in front that is moving to the driver`s lane and upon realization of this the driver accelerates to run away from it before it crosses his/her lane. However, unfortunately, it was not clear enough.

Another item (“Bazı durumlarda aracımdan inip diğer araç sürücüleri veya yayalarla tartışırım”) was intended to be in the second factor (driver urgency), but it only loaded on the fourth factor (driver lack of perseverance) with a relatively low value of .303. It is, however, not clear to the researcher why this items was responded in a similar pattern with the items of the fourth factor involving lack of attention or concentration for the task at hand.

Finaly, another item (“Birşeyle burun buruna gelince sağa-sola hiç bakmadan direksiyonu kırarım”) was dropped, because it crossloaded on both the first factor (driver functional impulsivity) and the fourth factor (driver lack of perseverance) having similar values (i.e., .324 and -.390 respectively).

In the final analysis, after eliminating the seven items mentioned above, the total variance explained by the four factors was 44.98 %. The loadings of the items to corresponding factors and the communality values are presented in Table 4.1.

**Table 4.1. Factor loadings and the communality values of the Items of the Impulsive Driver Behavior Scale**

| | Component | | | | Communality |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | |
| Tehlike anında hızlı karar verebilirim. | .812 | | | | .674 |
| Tehlike anında seri hareketler yapabilirim. | .808 | | | | .624 |
| Tehlike anında hızlıca aynaları kontrol ederek hemen şerit değiştiririm. | .766 | | | | .606 |
| Tehlike anında iyi tepkiler verebilirim. | .750 | | | | .540 |
| Tehlike anında kuvvetli refleks göstererek kurtarırım. | .727 | | | | .511 |
| Tehlike anında yavaşlarken bir yandan da hızlıca çevreyi kontrol ederek kaçacak güvenli bir yer bulmaya calışırım. | .711 | | | | .605 |
| Tehlike anında panik yapmam. | .704 | | | | .466 |
| Tehlike anında sağa sola hizlica bakıp kontrol ederek manevra yaparım. | .697 | | | | .541 |
| Kaza olabilecek bir durumda kurtarabilmek için en boş yer neresi çok hızlı görüp oraya kaçarım. | .671 | | | | .470 |
| Tehlike anında hızımı ve yolun durumunu hızlıca gözden geçirip uygunsa manevra yaparım. | .619 | | | | .47 |
| Önüme aniden birşey çıktığında fren yapmadan önce hemen dikiz aynasından arkayı kontrol ederim. | .595 | | | | .410 |
| Trafikte aniden durmam gereken bir şey olursa durmadan önce hızla etrafı kontrol edebilirim. | .577 | | | | .437 |
| Yolun ilerisindeki bir sıkışma durumunu fark edip hemen dörtlüleri yakarak arkadan gelen araçlarin yavaşlamasını sağlarım. | .396 | | | | .169 |
| Hiç acelem olmasa bile araç kullanırken sabırsız davranırım. | | .784 | | | .640 |
| Acelem olmasa da araç kullanırken hiçbir şekilde trafikte beklemeye veya yavaş gitmeye tahammül | | .767 | | | .562 |

| | | | |
|---|---|---|---|
| edememem. | | | |
| Bir şeye/yere gecikiyor olmasam da araç kullanırken aceleci davranırım. | .742 | | .627 |
| Acelem olmadığı halde önümdeki araç yavaşsa onu geçmekten kendimi alamam. | .719 | | .489 |
| Yapmamam gerektiğini bildiğim halde hızlı sürmekten kendimi alamam. | .674 | | .529 |
| Araç kullanırken genel kurallara uymayanlara veya çok yavaş gidenlere aşırı sinirlenirim. | .622 | | .43 |
| Acelem olmasa da ışıklarda arabayı hızlı kaldırmaktan kendimi alamam. | .566 | | .432 |
| Aracımın içinden bazı durumlarda diğer araç sürücülerine küfreder veya el-kol hareketi yaparım. | .539 | | .348 |
| Bazı durumlarda diğer sürücülere bağırırım. | .526 | | .344 |
| Tehlikeli olduğunu düşündüğüm halde, kırmızı ışığın yanmasına çok az zaman varsa ışıkta kalmamak icin gaza basarim. | .479 | | .325 |
| Gereksiz olduğunu düşündüğüm durumlarda bile korna çalarım. | .341 | | .295 |
| Araç kullanırken güvenlik zaafiyeti oluşturabilecek davranışlardan kaçınırım. | | .654 | .546 |
| Araç kullanmaya başlamadan önce emniyet kemerini takarım. | | .644 | .383 |
| Tüm trafik kurallarına uyarak araç kullanırım. | | .620 | .491 |
| Dar yollarda hız yapmam. | | .620 | .456 |
| Hava şartlarına dikkat ederek araç kullanırım. | | .600 | .465 |
| Işıklara yaklaşırken yavaşlarım. | | .581 | .431 |
| Herşeyi düşünerek, önceden planlayarak araç kullanırım (örneğin kavşakta sağa döneceksem kavşağa 200m kala sağ şeride geçerim). | | .566 | .435 |
| Temkinli araç kullanırım. | | .555 | .464 |
| Araç kullanırken sürekli sağa-sola ve arkaya-öne bakarak etrafı kontrol ederim. | | .461 | .384 |
| Arkadan gelen bir araç olmasa bile sinyal veririm. | | .460 | .269 |

| | | |
|---|---|---|
| Araç kullanırken tehlike anında dalgınlık nedeniyle boş bulunabilirim. | .729 | .562 |
| Araç kullanırken dalıp o an gitmek istediğim yere değil de normalde sürekli gittiğim yere gittigim olur. | .700 | .497 |
| Araç kullanırken yola bakmak yerine çevredeki insanlara veya reklam panolarına bakarım. | .592 | .416 |
| Araç kullanırken zihnim başka şeylerle meşguldur. | .561 | .403 |
| Araç kullanırken müziğe eşlik edip dikkatim dağılabilir. | .548 | .347 |
| Otoyolda giderken dalgınlıktan yanlış gişeye girebilirim. | .526 | .286 |
| Trafik işaretleri değişmiş olsa bile dikkatsizlikten eski kural neyse onu uyguladığım olur | .493 | .280 |
| Trafikte akış esnasında durunca el frenini çekmeyi unutabilirim. | .486 | .235 |

### 4.1.2. Impulsive Driver Scale

A factor analysis using principal component analysis as the extraction method was conducted on the 40 items of the Impulsive Driver Scale developed in the first study. An orthogonal rotation method, Varimax was used, since the correlations among components did not reach .30. The Kaiser-Meyer-Olkin Measure of sampling adequacy was .906 and the Bartlett's test of sphericity was significant ($df=780$, $p < .001$) which shows that the correlation matrix produced by the items is factorable. Using the percentage of variance accounted for by the factors as the criterion to decide on the number of factors (40 % was set as the cutoff) mentioned in Reise et al. (2000), the number of factors extracted was two in the final analysis.

The first factor ($\alpha = .92$) was composed of 23 items and the communalities of these items ranged between .165 and .558. This factor was labeled as "driver dysfunctional impulsivity" as the potential marker items having the highest communality values in this factor was "lacking self-control" (kendini kontrol edemeyen) ; "thoughtless" (dusuncesiz); "reckless" (umursamaz); and "irresponsible" (sorumsuz).

The second factor ($\alpha$ = .88) was composed of 12 items and the communalities of these items ranged between .201 and .676. This factor was labeled as “driver functional impulsivity” as the potential marker items having the highest communality values in this factor was “highly perceptive ” (algisi yuksek olan); “having high cognitive capacity” (bilissel kapasitesi yuksek olan); “having strong hand-arm-foot coordination” (el-kol-ayak koordinasyonu guclu olan); and “skillful” (becerikli).

A total of five items were dropped in the final analysis. Two of these items had crossloadings from both of the factors (i.e., “acemi”and “panik”). One of the items was dropped, because it failed to exceed the cutoff of .30 for loadings (i.e., “garantici”). Finally, the remaining two items were dropped, because these items did not load on the intended factor. These items were “heyecanli” and “telasli” which were written as reversed items for driver functional impulsivity, however, it seems that they were not perceived by the respondents as the researcher intended to be.

In the final analysis, after eliminating the five items mentioned above, the total variance explained by the two factors was 43.08 %. The loadings of the items to corresponding factors and the communality values are presented in Table 4.2.

**Table 4.2. Factor loadings and communality values of the items of Impulsive Driver Scale**

| | Component | | |
|---|---|---|---|
| | 1 | 2 | Communality |
| Kendini kontrol edemeyen | .725 | | .558 |
| Agresif/Saldırgan | .690 | | .481 |
| Umursamaz | .687 | | .505 |
| Düşüncesiz | .661 | | .514 |
| Tahammülsüz | .661 | | .473 |
| Sorumsuz | .660 | | .502 |
| Bencil | .653 | | .434 |
| Duyarsız | .642 | | .455 |

| | | | |
|---|---|---|---|
| Bilinçsiz | .633 | | .468 |
| Vurdumduymaz | .631 | | .456 |
| Temkinsiz | .623 | | .476 |
| Sinirli | .620 | | .408 |
| Gergin | .609 | | .373 |
| Dürtüsel | .600 | | .361 |
| Dikkatsiz | .593 | | .426 |
| Aceleci | .590 | | .384 |
| Gamsız | .583 | | .379 |
| Sabırsız | .578 | | .384 |
| Dalgın | .576 | | .405 |
| Tepkisel | .575 | | .333 |
| Stresli | .572 | | .331 |
| Zihni meşgul | .505 | | .264 |
| Tezcanlı | .374 | | .165 |
| Algısı yüksek olan | | .796 | .676 |
| Bilişsel kapasitesi yüksek olan | | .775 | .615 |
| El-kol-ayak koordinasyonu güçlü olan | | .769 | .614 |
| Becerikli | | .760 | .588 |
| Zeki | | .752 | .573 |
| Kafası hızlı çalışan | | .740 | .551 |
| Refleksleri kuvvetli olan | | .672 | .456 |
| Hareketli | | .619 | .384 |
| Tetikte | | .553 | .306 |
| Deneyimli | | .539 | .295 |
| Soğukkanlı | | .513 | .285 |
| Hazırcevap | | .423 | .201 |

### 4.1.3. Dickman Functional/Dysfunctional Impulsivity Scale

A factor analysis using principal component analysis as the extraction method was conducted on the Turkish adaptation of the 23 items of the Dickman Functional/Dysfunctional Impulsivity Scale. An orthogonal rotation method, Varimax was used, since the correlations among components did not reach .30. The Kaiser-Meyer-Olkin Measure of sampling adequacy was .827 and the Bartlett's test of sphericity was significant ($df = 253$, $p < .001$) which shows that the correlation matrix produced by the items is factorable. The analysis was conducted by setting the number of factors to be extracted as two to stick with the factor structure of the original scale.

The first factor ($\alpha = .83$) was composed of 11 items. The dysfunctional impulsivity items of the original scale loaded on this factor with communalities ranging between .199 and .530. The items with the highest communality values were "Çoğu zaman harekete geçmeden önce düşünüp taşınmak için yeterince zaman ayırmam" and "Çoğu zaman sonuçlarını düşünmeden bir şeyler söyler ve yaparım". Only one item (i.e., "Oncelikle olasi sorunlari degerlendirmeden projelerde nadiren yer alirim") from the original dysfunctional impulsivity subscale was dropped due to having a loading value (to this factor) lower than the cutoff of .30.

The second factor ($\alpha = .73$) was composed of 10 items. The functional impulsivity items of the original scale loaded on this factor with communalities ranging between .109 and .434. The items with the highest communality values were "Çok fazla anlık karar vermemi gerektiren bir işte çalışmaktan keyif alırdım" and "Hızlı düşünebildiğim için insanlar bana hayran kalır". Only one item (i.e., "Ne giyecegim ya da aksam yemeginde ne yiyecegim gibi basit secimlerde bile aceleyle karar vermeyi sevmem") from the original functional impulsivity subscale was dropped due to having a loading value (to this factor) lower than the cutoff of .30.

In the final analysis, after eliminating the two items mentionad above, the total variance explained by the two factors was 35.10 %. The loadings of the items to corresponding factors and the communality values are presented in Table 4.3.

**Table 4.3. Factor loadings and communality values of the items of Dickman Funcitonal/Dysfunctional Impulsivity Scale**

| Items | Component | | Communality |
|---|---|---|---|
| | 1 | 2 | |
| Çoğu zaman sonuçlarını düşünmeden bir şeyler söyler ve yaparım. | .712 | | .510 |
| Çoğu zaman harekete geçmeden önce düşünüp taşınmak için yeterince zaman ayırmam. | .710 | | .530 |
| Düşünmeden hareket ettiğim için çoğu zaman başımı derde sokarim. | .661 | | .437 |
| Çoğu zaman bir durumu bütün yönleriyle değerlendirmeye vakit ayırmadan karar veririm. | .633 | | .422 |
| Çoğu zaman alım gücümün gerçekten yetip yetmeyeceğini düşünmeden bir şeyler satın alırım. | .622 | | .395 |
| Öncesinde dikkatli bir şekilde düşünüp taşınmadığım için çoğu kez yaptığım planlar sonuca ulaşmaz. | .590 | | .381 |
| Çoğu zaman müsait olup olmadığımı düşünmeden randevular veririm. | .589 | | .349 |
| Çoğu zaman aklıma geleni düşünmeden söylerim. | .583 | | .351 |
| Önemli bir karar vermeden önce artılarını ve eksilerini dikkatli bir sekilde tartarım. | .538 | | .303 |
| Dikkatli bir şekilde akıl yürütmek konusunda iyiyimdir. | .530 | | .325 |
| Sorunları/problemleri sakin sakin ve dikkatli bir şekilde çözmekten keyif alırım. | .427 | | .199 |
| Hızlı düşünebildiğim için insanlar bana | | .645 | .417 |

| | | |
|---|---|---|
| hayran kalır. | | |
| Çok fazla anlık karar vermemi gerektiren bir işte çalışmaktan keyif alırdım. | .614 | .434 |
| Bir sonraki hamlenizi çabucak belirlemenizi gerektiren spor ve oyunlari severim. | .597 | .361 |
| Çoğu zaman düşüncelerimi kelimelere çok hızlı bir şekilde dökebilirim. | .563 | .337 |
| Derhal bir şey yapmak zorunda olduğunuz yoksa şansınızı kaybedeceğiniz anlık fırsatlardan yararlanmakta iyiyimdir. | .545 | .301 |
| Konuşmadan önce düşünmek için çok fazla zamanın olmadığı hakikaten hızlı gelişen diyaloglarda bulunmayı severim. | .545 | .345 |
| Hızlı bir şekilde karar vermek zorunda olduğum zaman rahat edemem. | .535 | .286 |
| Harekete geçmeden önce düşümek icin çok zamanınızın olmadığı aktivitelerden kaçınmaya calışırım. | .512 | .262 |
| Yeterince hızlı karar veremediğim için fırsatları kaçırdığım çok olmuştur. | .478 | .316 |
| Çok zor olmayan bir şey yapıyor olsam dahi bir şeyleri hızlı yapmayı sevmem. | .315 | .109 |

## 4.2. Analyses with Background Variables

### 4.2.1. Gender differences

#### 4.2.1.1. Gender differences on DBQ and DSI factors

A series of ACOVAs were conducted to examine whether there are gender differences on DBQ and DSI factors after controlling for the effects of age and total mileage.

There were significant gender differences on DBQ-ordinary violations ($F(1, 463) = 21.34$, $p < .001$, *Partial Eta Squared* = .04); DBQ-(general) violations ($F(1,$

463) = 15.47, $p < .001$, *Partial Eta Squared* = .03); DBQ-errors ($F(1, 461) = 9.69$, $p < .005$, *Partial Eta Squared* = .02); and DSI-perceptual-motor skills ($F(1, 456) = 8.17$, $p < .005$, *Partial Eta Squared* = .02). Men reported significantly higher scores than women on ordinary violations, (general) violations, errors and DSI perceptual-motor skills.

#### 4.2.1.2. Gender differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are gender differences on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age and total mileage.

There were significant gender differences on BIS-15 motor impulsivity ($F(1, 495) = 5.17$, $p < .05$, *Partial Eta Squared* = .01);UPPS sensation seeking ($F(1, 429) = 11.50$, $p < .005$, *Partial Eta Squared* = .03); and Dickman`s dysfunctional impulsivity ($F(1, 446) = 5.58$, $p < .05$, *Partial Eta Squared* = .01). Men reported significantly higher scores than women on BIS-15 motor impulsivity, UPPS sensation seeking and Dickman`s dysfunctional impulsivity factors.

#### 4.2.1.3. Gender differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are gender differences on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age and total mileage.

There were significant gender differences on driver lack of premeditation ($F(1, 488) = 14.87$, $p < .001$, *Partial Eta Squared* = .03); driver functional impulsivity factor of Impulsive Driver Behavior Scale ($F(1, 490) = 14.14$, $p < .001$, *Partial Eta Squared* = .03), and functional impulsivity factor of the Impulsive Driver Behavior Scale ($F(1, 482) = 4.20$, $p < .05$, *Partial Eta Squared* = .01). Men reported significantly higher scores than women on driver lack of premeditation and driver functional impulsivity factors of the Impulsive Driver Behavior Scale, and on the functional impulsivity factor of the Impulsive Driver Scale.

### 4.2.2. Differences between "number of accidents" groups

Respondents were asked to indicate the number of accidents they had experienced in the last three years regardless of the severity and the faulty party (whether they were the one at fault or not in that accident). This continuous variable were categorized into three groups as the first group ($N$ = 213) having no accidents in the last three years; the second group ($N$ = 136) having only one accidents in the last three years; and the third group ($N$ = 153) having two or more accidents in the last three years. The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

#### 4.2.2.1. Differences between "number of accidents" groups on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the three "number of accidents" groups on DBQ and DSI factors after controlling for the effects of age, gender and total mileage.

There were significant differences between the "number of accidents" groups on DBQ-aggressive violations ($F(2, 455) = 3.05$, $p < .05$, *Partial Eta Squared* = .01). The Bonferroni adjusted multiple comparisons revealed that the second group having one accident in the last three years had significantly higher scores on aggressive violations (*Adjusted M* = 1.40, *SD* = .08) than the first group having no accidents in the last three years (*Adjusted M* = 1.14, *SD* = .07). The difference between the first and the third group ; and that between the second and the third group was not significant

There were also significant differences between the "number of accidents" groups on DBQ-errors ($F(2, 455) = 6.33$, $p < .005$, *Partial Eta Squared* = .03). The Bonferroni adjusted multiple comparisons revealed that the third group having two or more accidents in the last three years had significantly higher scores on errors (*Adjusted M* = 0.83, *SD* = .05) than the first group having no accidents in the last three years (*Adjusted M* = 0.60, *SD* = .04). The difference between the first and the second group (having only one accident in the last three years); and that between the second and the third group was not significant.

Moreover, there were significant differences between the "number of accidents" groups on DBQ-lapses ($F(2, 457) = 4.70$, $p < .05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the third group

having two or more accidents in the last three years had significantly higher scores on errors (*Adjusted M* = 0.86, *SD* = .05) than the first group having no accidents in the last three years (*Adjusted M* = 0.68, *SD* = .04). The difference between the first and the second group; and that between the second and the third group was not significant.

However, the "number of accidents" groups did not differ on the DSI factors.

#### 4.2.2.2. Differences between "number of accidents" groups on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three "number of accidents" groups on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age, gender and total mileage. However, the groups did not significantly differ from each other on any of the dimensions of the general impulsivity scales included in the present study.

#### 4.2.2.3. Differences between "number of accidents" groups on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three "number of accidents" groups on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age, gender and total mileage. However, the groups did not significantly differ from each other on any of the dimensions of the general impulsivity scales included in the present study.

The main effect of "number of accidents" on driver urgency was significant ($F(2, 490) = 3.07$, $p < .05$, *Partial Eta Squared* = .01). However, the Bonferroni adjusted multiple comparisons revealed that none of the differences between binary combinations of groups was significant. But, there was a trend reflecting the lowest driver urgency mean score of the first group having no accidents in the last three years (*Adjusted M* = 2.43, *SD* = .05), followed by the second group having only one accident in the last three years (*Adjusted M* = 2.59, *SD* = .06) and the third group having two or more accidents in the last three years (*Adjusted M* = 2.61, *SD* = .06) respectively.

Furthermore, the main effect of "number of accidents" on driver lack of perseverance was significant ($F(2, 482) = 3.33$, $p < .05$, *Partial Eta Squared* = .01). The Bonferroni adjusted multiple comparisons revealed that the third group having two or more accidents in the last three years had significantly higher scores on driver lack of perseverance (*Adjusted M* = 2.22, *SD* = .05) than the first group having no accidents in the last three years (*Adjusted M* =2.05, *SD* = .04). The difference between the first and the second group; and that between the second and the third group was not significant.

Finally, the main effect of "number of accidents" on dysfunctional impulsivity factor of the Impulsive Driver Scale was significant ($F(2, 479) = 3.74$, $p < .05$, *Partial Eta Squared* = .02). Again, only the first and the third groups significantly differed from each other. The Bonferroni adjusted multiple comparisons revealed that the third group having two or more accidents in the last three years had significantly higher scores on driver dysfunctional impulsivity (*Adjusted M* = 2.01, *SD* = .05) than the first group having no accidents in the last three years (*Adjusted M* =1.85, *SD* = .04).

### 4.2.3. Differences between "number of speeding tickets on urban roads" groups

Respondents were asked to indicate the number of tickets for exceeding the speed limits on urban roads in the last three years. This continuous variable were categorized into two groups as the first group ($N = 365$) having no tickets due to exceeding the speed limits on urban roads in the last three years; and the second group ($N = 123$) having one or more tickets in the last three years. The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

#### 4.2.3.1. Group differences on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets due to speeding on the urban roads on DBQ and DSI factors after controlling for the effects of age, gender and total mileage.

The main effect of the number of speeding tickets groups was significant on DBQ ordinary violations ($F(1, 445) = 34.19$, $p < .001$, *Partial Eta Squared* = .07);

DBQ aggressive violations ($F(1, 443) = 9.28$, $p < .005$, *Partial Eta Squared* = .02); DBQ (general) violations ($F(1, 445) = 31.61$, $p < .001$, *Partial Eta Squared* = .07); DBQ errors ($F(1, 443) = 5.79$, $p < .05$, *Partial Eta Squared* = .01); lapses ($F(1, 445) = 11.25$, $p < .005$, *Partial Eta Squared* = .03); DBQ positive behaviors ($F(1, 445) = 5.82$, $p < .05$, *Partial Eta Squared* = .01); and DSI safety skills factor ($F(1, 439) = 9.24$, $p < .005$, *Partial Eta Squared* = .02).

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more residential/urban speeding tickets in the last three years had significantly higher scores than the first group having no such tickets on ordinary violations, aggressive violations, (general) violations, errors and lapses factors of DBQ. On the other hand, the first group having no residential/urban speeding tickets had significantly higher scores than the second group having one or more such tickets on DBQ positive behaviors factor and DSI safety skills factor.

#### 4.2.3.2. Group Differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets due to speeding on the urban roads on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of speeding tickets groups was significant on BIS-15 nonplanning impulsivity ($F(1, 476) = 10.84$, $p < .005$, *Partial Eta Squared* = .02); BIS-15 motor impulsivity ($F(1, 476) = 5.91$, $p < .05$, *Partial Eta Squared* = .01); BIS-15 attentional impulsivity ($F(1, 476) = 13.71$, $p < .001$, *Partial Eta Squared* = .03); UPPS lack of perseverance ($F(1, 415) = 8.57$, $p < .005$, *Partial Eta Squared* = .02); and Dickman`s dysfunctional impulsivity ($F(1, 430) = 8.46$, $p < .005$, *Partial Eta Squared* = .02).

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more residential/urban speeding tickets in the last three years had significantly higher scores than the first group having no such tickets on BIS-15 nonplanning, motor and attentional impulsivity factors, UPPS lack of perseverance factor and Dickman`s dysfunctional impulsivity factor.

#### 4.2.3.3. Group Differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets due to speeding on the urban roads on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of speeding tickets groups was significant on driver urgency ($F(1, 477 = 15.39$, $p < .001$, *Partial Eta Squared* = .03); driver lack of premeditation ($F(1, 469) = 8.57$, $p < .005$, *Partial Eta Squared* = .02); driver lack of perseverance ($F(1, 469) = 10.35$, $p < .005$, *Partial Eta Squared* = .02) factors of Impulsive Driver Behavior Scale; and dysfunctional impulsivity factor of Impulsive Driver Scale ($F(1, 466) = 7.99$, $p < .01$, *Partial Eta Squared* = .02).

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more residential/urban speeding tickets in the last three years had significantly higher scores than the first group having no such tickets on driver urgency, driver lack of premeditation and driver lack of perseverance factors of the Impulsive Driver Behavior Scale and the dysfunctional impulsivity factor of the Impulsive Driver Scale.

### 4.2.4. Differences between "number of speeding tickets on intercity roads" groups

Respondents were asked to indicate the number of tickets for exceeding the speed limits on intercity roads in the last three years. This continuous variable were categorized into two groups as the first group ($N$ = 377) having no tickets due to exceeding the speed limits on rural roads in the last three years; and the second group ($N$ = 113) having one or more tickets in the last three years. The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

#### 4.2.4.1. Group differences on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets due to speeding on the intercity roads on DBQ and DSI factors after controlling for the effects of age, gender and total mileage.

The main effect of the number of speeding tickets groups was significant on DBQ ordinary violations ($F(1, 447) = 7.39$, $p < .01$, *Partial Eta Squared* = .02) and DBQ (general) violations ($F(1, 447) = 3.97$, $p < .05$, *Partial Eta Squared* = .01).

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more rural speeding tickets in the last three years had significantly higher scores than the first group having no such tickets on ordinary violations and (general) violations factors of DBQ.

However, the groups did not differ significantly on DSI factors.

#### 4.2.4.2. Group Differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets due to speeding on the intercity roads on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of speeding tickets groups was only significant on BIS-15 motor impulsivity ($F(1, 479) = 5.36$, $p < .05$, *Partial Eta Squared* = .01). The Bonferroni adjusted multiple comparisons revealed that the second group having one or more rural speeding tickets in the last three years had significantly higher scores than the first group having no such tickets on BIS-15 motor impulsivity factors.

However, the groups based on intercity speeding tickets did not differ significantly on any of the UPPS Impulsive Behavior Scale and Dickman Functional/Dysfunctional Impulsivity Scale factors.

#### 4.2.4.3. Group Differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets due to speeding on the intercity roads on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of speeding tickets groups was significant only on driver urgency factor of the Impulsive Driver Behavior Scale ($F(1, 479 = 7.04$, $p$

< .01, *Partial Eta Squared* = .01). The Bonferroni adjusted multiple comparisons revealed that the second group having one or more rural speeding tickets in the last three years had significantly higher scores than the first group having no such tickets on driver urgency.

However, the groups did not differ significantly on the Impulsive Driver Scale factors.

#### 4.2.5. Differences between "number of parking tickets" groups

Respondents were asked to indicate the number of tickets for inappropriate parking in the last three years. This continuous variable were categorized into two groups as the first group ($N$ = 380) having no tickets due to inappropriate parking in the last three years; and the second group ($N$ = 117) having one or more tickets in the last three years. The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

##### 4.2.5.1. Group differences on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets for inappropriate parking on DBQ and DSI factors after controlling for the effects of age, gender and total mileage.

The main effect of the number of inappropriate parking tickets was significant on DBQ errors ($F$(1, 451) = 5.73, $p$ < .05, *Partial Eta Squared* = .01) and DBQ lapses ($F$(1, 453) = 5.19, $p$ < .05, *Partial Eta Squared* = .01). The Bonferroni adjusted multiple comparisons revealed that the second group having one or more inappropriate parking tickets in the last three years had significantly higher scores than the first group having no such tickets on errors and lapses factors of DBQ.

However, the groups did not differ significantly on DSI factors.

##### 4.2.5.2. Group Differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets for inappropriate parking on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of inappropriate parking tickets was significant on BIS-15 nonplanning impulsivity ($F(1, 485) = 9.89$, $p < .005$, *Partial Eta Squared* = .02); BIS-15 motor impulsivity ($F(1, 485) = 5.94$, $p < .05$, *Partial Eta Squared* = .01); BIS-15 attentional impulsivity ($F(1, 485) = 5.01$, $p < .05$, *Partial Eta Squared* = .01); .UPPS urgency ($F(1, 419) = 4.97$, $p < .05$, *Partial Eta Squared* = .01); and Dickman`s dysfunctional impulsivity ($F(1, 436) = 5.04$, $p < .05$, *Partial Eta Squared* = .01).

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more inappropriate parking tickets in the last three years had significantly higher scores than the first group having no such tickets on all of the three BIS-15 factors, UPPS urgency factor and dysfunctional impulsivity factor of Dickman`s Functional/Dysfunctional impulsivity scale.

#### 4.2.5.3. Group Differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets for inappropriate parking on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of inappropriate parking tickets was significant only on driver lack of perseverance factor of the Impulsive Driver Behavior Scale ($F(1, 478 = 10.66$, $p < .005$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the second group having one or more inappropriate parking tickets in the last three years had significantly higher scores on driver lack of perseverance than the first group having no such tickets.

However, the groups did not differ significantly on the Impulsive Driver Scale factors.

### 4.2.6.Differences between “running the red light” groups

Respondents were asked to indicate the number of tickets for running the red light in the last three years. This continuous variable were categorized into two groups as the first group ($N$ =400) having no tickets due to running the red light in the last three years; and the second group ($N$ = 97) having one or more tickets in the last three

years. The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

#### 4.2.6.1.Group differences on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets for running the red light on DBQ and DSI factors after controlling for the effects of age, gender and total mileage.

The main effect of the number of tickets for running the red light was significant on DBQ ordinary violations ($F(1, 453) = 20.01$, $p < .001$, *Partial Eta Squared* = .04); DBQ aggressive violations ($F(1, 451) = 6.76$, $p < .05$, *Partial Eta Squared* = .02); DBQ (general) violations ($F(1, 453) = 19.57$, $p < .001$, *Partial Eta Squared* = .04); DBQ errors ($F(1, 451) = 4.27$, $p < .05$, *Partial Eta Squared* = .01); lapses ($F(1, 453) = 10.65$, $p < .005$, *Partial Eta Squared* = .02); and DSI safety skills ($F(1, 446) = 13.13$, $p < .001$, *Partial Eta Squared* = .03).

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more tickets for running the red light in the last three years had significantly higher scores than the first group having no such tickets on ordinary violations, aggressive violations, (general) violations, errors and lapses factors of DBQ. On the other hand, the second group having one or more tickets for running the red light in the last three years had significantly lower scores than the first group having no tickets on DSI safety skills.

#### 4.2.6.2.Group Differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets for red light running on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of tickets for red light running was significant on BIS-15 nonplanning impulsivity ($F(1, 485) = 9.70$, $p < .005$, *Partial Eta Squared* = .02); BIS-15 attentional impulsivity ($F(1, 485) = 7.72$, $p < .01$, *Partial Eta Squared* = .02); and Dickman`s dysfunctional impulsivity ($F(1, 436) = 6.07$, $p < .05$, *Partial Eta Squared* = .01).

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more tickets for running the red light in the last three years had significantly higher scores than the first group having no such tickets on BIS-15 nonplanning and attentional impulsivity factors, and the dysfunctional impulsivity factor of Dickman`s Functional/Dysfunctional impulsivity scale.

#### 4.2.6.3.Group Differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the two groups based on number of tickets for running the red light on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age, gender and total mileage.

The main effect of the number of tickets for running the red light was significant on driver urgency ($F(1, 486) = 12.97$, $p < .001$, *Partial Eta Squared* = .03); driver lack of premeditation ($F(1, 478) = 7.40$, $p < .01$, *Partial Eta Squared* = .02); driver lack of perseverance ($F(1, 478 = 6.33$, $p < .05$, *Partial Eta Squared* = .01) factors of the Impulsive Driver Behavior Scale; and both the functional impulsivity ($F(1, 472 = 4.30$, $p < .05$, *Partial Eta Squared* = .01) and dysfunctional impulsivity ($F(1, 475 = 5.24$, $p < .05$, *Partial Eta Squared* = .01) factors of the Impulsive Driver Scale.

The Bonferroni adjusted multiple comparisons revealed that the second group having one or more tickets for running the red light in the last three years had significantly higher scores than the first group having no such tickets on driver urgency, driver lack of premeditation, driver lack of perseverance factors of the Impulsive Driver Behavior Scale and the dysfunctional impulsivity factor of the Impulsive Driver Scale. On the other hand, the first group having no tickets for running the red light in the last three years had significantly higher scores than the second group having one or more such tickets on functional impulsivity factor of the Impulsive Driver Scale.

### 4.2.7.Differences between “overtaking” groups

Respondents were asked to indicate the ratio of their overtaking frequency to the overtaking frequency of other drivers. This question was in forced choice format, with three options; 1) “I overtake less frequently than other drivers overtake me”, 2) “I overtake as frequently as other drivers overtake me”, 3) “I overtake more frequently than other drivers overtake me”. There were 223 respondents in the first group, 161 in the second group, and 118 in the third group. The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

#### 4.2.7.1.Group differences on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on overtaking frequency on DBQ and DSI factors after controlling for the effects of age, gender and total mileage.

The main effect of overtaking frequency was significant on DBQ ordinary violations ($F(2, 457) = 31.03$, $p < .001$, *Partial Eta Squared* = .12). The Bonferroni adjusted multiple comparisons revealed that the first group having less overtaking frequency than being overtaken (*Adjusted M* = 0.83, *SD* = .04) reported significantly lower scores on ordinary violations than the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 0.99, *SD* = .05) and the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =1.40, *SD* = .06). In addition, the second group had significantly lower scores on ordinary violations than the third group.

The main effect of overtaking frequency was significant on DBQ aggressive violations ($F(2, 455) = 9.04$, $p < .001$, *Partial Eta Squared* = .04). The Bonferroni adjusted multiple comparisons revealed that the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =1.54, *SD* = .09) had significantly higher scores on aggressive violations than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 1.08, *SD* = .06) and the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 1.24, *SD* = .07). However, the difference between the first and the second group was not significant.

The main effect of overtaking frequency was significant on DBQ (general) violations ($F(2, 457) = 29.00$, $p < .001$, *Partial Eta Squared* = .11). The Bonferroni adjusted multiple comparisons revealed that the first group having less overtaking frequency than being overtaken (*Adjusted M* = 0.89, *SD* = .04) reported significantly lower scores on ordinary violations than the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 1.05, *SD* = .05) and the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =1.43, *SD* = .06). In addition, the second group had significantly lower scores on ordinary violations than the third group.

The main effect of overtaking frequency was significant on DSI perceptual-motor skills ($F(2, 450) = 14.82$, $p < .001$, *Partial Eta Squared* = .06). The Bonferroni adjusted multiple comparisons revealed that the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =3.18, *SD* = .05) had significantly higher scores on perceptual-motor skills than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 2.86, *SD* = .03) and the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 2.97, *SD* = .04). However, the difference between the first and the second group was not significant.

The main effect of overtaking frequency was significant on DSI safety skills ($F(2, 450) = 15.22$, $p < .001$, *Partial Eta Squared* = .06). The Bonferroni adjusted multiple comparisons revealed that the first group having less overtaking frequency than being overtaken (*Adjusted M* = 3.01, *SD* = .04) reported significantly higher scores on safety skills than the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 2.87, *SD* = .04) and the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =2.67, *SD* = .05). In addition, the second group had significantly higher scores on safety skills than the third group.

#### 4.2.7.2.Group Differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on overtaking frequency on general impulsivity

measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age, gender and total mileage.

The main effect of overtaking frequency was significant only on sensation seeking factor of UPPS ($F(2, 424) = 5.91$, $p < .005$, *Partial Eta Squared* = .03). The Bonferroni adjusted multiple comparisons revealed that third group indicating more frequently overtaking than being overtaken (*Adjusted M* =2.70, *SD* = .06) had significantly higher scores on UPPS sensation seeking than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 2.45, *SD* = .04) and the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 2.47, *SD* = .05). However, the difference between the first and the second group was not significant.

However, the three groups did not differ significantly on factors of BIS-15 and Dickman Functional/Dysfunctional Impulsivity Scale.

#### 4.2.7.3.Group Differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on overtaking frequency on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age, gender and total mileage.

The main effect of overtaking frequency was significant on driver urgency ($F(2, 490) = 40.81$, $p < .001$, *Partial Eta Squared* = .14). The Bonferroni adjusted multiple comparisons revealed that the first group having less overtaking frequency than being overtaken (*Adjusted M* = 2.26, *SD* = .05) reported significantly lower scores on driver urgency than the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 2.55, *SD* = .05) and the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =2.97, *SD* = .06). In addition, the second group had significantly lower scores on driver urgency than the third group.

The main effect of overtaking frequency was significant on driver lack of premeditation ($F(2, 482) = 5.11$, $p < .01$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =1.91, *SD* = .05) had

significantly higher scores on driver lack of premeditation than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 1.71, *SD* = .04) and the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 1.75, *SD* = .04). However, the difference between the first and the second group was not significant.

The main effect of overtaking frequency was significant on driver lack of perseverance ($F(2, 482) = 3.92$, $p < .05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =2.25, *SD* = .06) had significantly higher scores on driver lack of perseverance than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 2.05, *SD* = .04). However, the difference between the first and the second group; and that between the second and the third group was not significant.

The main effect of overtaking frequency was significant on driver functional impulsivity ($F(2, 484) = 9.52$, $p < .001$, *Partial Eta Squared* = .04). The Bonferroni adjusted multiple comparisons revealed that the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =4.15, *SD* = .06) had significantly higher scores on driver functional impulsivity than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 3.87, *SD* = .04) and the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 3.88, *SD* = .05). However, the difference between the first and the second group was not significant.

The main effect of overtaking frequency was also significant on functional impulsivity factor of the Impulsive Driver Scale ($F(2, 476) = 10.07$, $p < .001$, *Partial Eta Squared* = .04). The Bonferroni adjusted multiple comparisons revealed that the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =4.19, *SD* = .05) had significantly higher scores on functional impulsivity factor of the Impulsive Driver Scale than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 3.92, *SD* = .04) and the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* = 3.94, *SD* = .04). However, the difference between the first and the second group was not significant.

The main effect of overtaking frequency was significant on dysfunctional impulsivity factor of the Impulsive Driver Scale ($F(2, 479) = 5.03$, $p < 01$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the third group indicating more frequently overtaking than being overtaken (*Adjusted M* =2.07, *SD* = .05) had significantly higher scores on dysfunctional impulsivity factor of the Impulsive Driver Scale than the first group having less overtaking frequency than being overtaken (*Adjusted M* = 1.88, *SD* = .04) and the second group indicating equal frequency of overtaking and being overtaken(*Adjusted M* =1.89, *SD* = .04). However, the difference between the first and the second group was not significant.

### 4.2.8.Differences between "driving frequency" groups

Respondents were asked to indicate their driving frequency in seven different situations, namely in winter; in heavy traffic; highway; other main roads; in urban roads; in rural roads; and in every situation in general. The items required responding on a five-point scale with the anchors of 1) every day, 2) once in a week, 3) twice a month, 4) once in a month, and 5)once in six months. The mean of the responses to these seven items were taken and three groups were formed based on the scores on the 33$^{rd}$ and the 66$^{th}$ percentiles of this average driving frequency value. The first group is the highest frequency driving group (*N*= 162), followed by the second group having moderate frequency driving (*N*= 172); and third group is the lowest frequency driving group (*N*= 171). The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

#### 4.2.8.1.Group differences on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on driving frequency on DBQ and DSI factors after controlling for the effects of age, gender and total mileage.

The main effect of driving frequency was significant only on errors factor of DBQ ($F(2, 458) = 4.38$, $p < 05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the first group indicating the highest driving frequency had significantly lower scores on errors (*Adjusted M* =0.58, *SD* = .05) than the second group who reported moderate frequency of driving (*Adjusted M* =0.76, *SD* = .05) and the third group having the lowest frequency of driving (*Adjusted M*

=0.75, *SD* = .05). However, the difference between the second and the third group on errors was not significant.

The main effect of driving frequency was significant on perceptual-motor skills factor of DSI (*F*(2, 453) = 13.12, *p* < 001, *Partial Eta Squared* = .06). The Bonferroni adjusted multiple comparisons revealed that the third group indicating the lowest driving frequency had significantly lower scores on perceptual-motor skills (*Adjusted M* =2.83, *SD* = .04) than the first group having the highest driving frequency (*Adjusted M* =3.11, *SD* = .04) and the second group who reported moderate frequency of driving (*Adjusted M* =2.99, *SD* = .04). However, the difference between the first and the second group on perceptual-motor skills was not significant.

#### 4.2.8.2.Group differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on driving frequency on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age, gender and total mileage.

The main effect of driving frequency was significant only on sensation seeking factor of UPPS (*F*(2, 426) = 4.08, *p* < .05, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the first group indicating the highest driving frequency had significantly higher scores on sensation seeking (*Adjusted M* =2.61, *SD* = .05) than the third group having the lowest driving frequency (*Adjusted M* =2.40, *SD* = .05). However, the difference between the first and the second group who reported moderate frequency of driving, and that between the second and the third group was not significant.

However, the three groups did not differ significantly on factors of BIS-15 and Dickman Functional/Dysfunctional Impulsivity Scale.

#### 4.2.8.3.Group differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on driving frequency on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age, gender and total mileage.

The main effect of driving frequency was significant on driver urgency ($F(2, 493) = 4.63$, $p < .05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the second group having the moderate frequency of driving (*Adjusted M* = 2.62, *SD* = .06) had significantly higher scores on driver urgency than the third group having the lowest driving frequency (*Adjusted M* = 2.39, *SD* = .06). However, the difference between the first group having the highest driving frequency and the second group was not significant on driver urgency.

The main effect of driving frequency was significant on driver functional impulsivity ($F(2, 487) = 13.41$, $p < .001$, *Partial Eta Squared* = .05). The Bonferroni adjusted multiple comparisons revealed that the first group having the highest driving frequency (*Adjusted M* =4.12, *SD* = .05) had significantly higher scores on driver functional impulsivity than the second group having moderate driving frequency (*Adjusted M* =3.94, *SD* = .05) and the third group having the lowest driving frequency (*Adjusted M* =3.78, *SD* = .05). In addition, the second group had significantly higher scores on driver functional impulsivity than the third group.

The main effect of driving frequency was also significant on functional impulsivity factor of the Impulsive Driver Scale ($F(2, 479) = 9.86$, $p < .001$, *Partial Eta Squared* = .04). The Bonferroni adjusted multiple comparisons revealed that the third group indicating the lowest frequency of driving (*Adjusted M* =3.85, *SD* = .04) had significantly lower scores on functional impulsivity factor of the Impulsive Driver Scale than the first group having the highest driving frequency (*Adjusted M* = 4.11, *SD* = .05) and the second group having moderate driving frequency (*Adjusted M* = 4.02, *SD* = .04). However, the difference between the first and the second group was not significant.

The main effect of driving frequency was significant on dysfunctional impulsivity factor of the Impulsive Driver Scale ($F(2, 482) = 4.21$, $p < 05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the first group having the highest driving frequency (*Adjusted M* = 1.85, *SD* = .05) had significantly lower scores on the dysfunctional impulsivity factor of the Impulsive Driver Scale than the second group having moderate driving frequency (*Adjusted M* = 2.02, *SD* = .04). However the difference between the first and the third group, and that between the second and the third group was not significant.

### 4.2.9.Differences between "total mileage" groups

Respondents were asked to indicate their total mileage and three groups were formed based on the scores on the 33rd and the 66th percentiles of this variable. The first group is the lowest total mileage group with lower than and equal to 25000 km (*N*= 171), followed by the second group having moderate total mileage (between 25000 km and 100000 km; *N*= 170); and third group is the highest total mileage group with more than 100000 km (*N*= 161). The analyses presented under the following three headings in this section were conducted by using this categorical variable as the IV.

#### 4.2.9.1.Group differences on DBQ and DSI

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on total mileage on DBQ and DSI factors after controlling for the effects of age and gender.

The main effect of total mileage was significant DBQ ordinary violations ($F(2, 462) = 3.22$, $p < 05$, *Partial Eta Squared* = .01). The Bonferroni adjusted multiple comparisons revealed that the second group having moderate total mileage (*Adjusted M* =1.09, *SD* = .05) had significantly higher scores on ordinary violations than the first group who reported the lowest total mileage (*Adjusted M* =0.90, *SD* = .06). However, the difference between the first and the third group, and that between the second and the third group on ordinary violations was not significant.

The main effect of total mileage was also significant DBQ aggressive violations ($F(2, 460) = 3.40$, $p < 05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the second group having moderate total mileage (*Adjusted M* =1.38, *SD* = .07) had significantly higher scores on aggressive violations than the first group who reported the lowest total mileage (*Adjusted M* =1.13, *SD* = .08). However, the difference between the first and the third group, and that between the second and the third group on aggressive violations was not significant.

The main effect of total mileage was also significant DBQ (general) violations ($F(2, 462) = 4.11$, $p < 05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the second group having moderate total mileage (*Adjusted M* =1.16, *SD* = .05) had significantly higher scores on (general) violations than the first group who reported the lowest total mileage (*Adjusted M*

=0.96, *SD* = .06). However, the difference between the first and the third group, and that between the second and the third group on (general) violations was not significant.

The main effect of total mileage was also significant on DSI perceptual-motor skills (*F*(2, 455) = 17.31, *p* < 001, *Partial Eta Squared* = .07). The Bonferroni adjusted multiple comparisons revealed that the first group who reported the lowest total mileage (*Adjusted M* =2.76, *SD* = .04) had significantly lower scores on perceptual-motor skills than the second group having moderate total mileage (*Adjusted M* =3.02, *SD* = .04) and the third group having the highest total mileage (*Adjusted M* =3.15, *SD* = .05). However, the difference between the second group and the third group was not significant.

Finally, the main effect of total mileage was also significant on DSI safety skills (*F*(2, 455) = 3.88, *p* < 05, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the third group having the highest total mileage (*Adjusted M* =2.96, *SD* = .05) had significantly higher scores on safety skills than the second group having moderate total mileage (*Adjusted M* =2.79, *SD* = .04). However, the difference between the first and the second group; and that between the first and the third group was not significant.

#### 4.2.9.2.Group differences on General Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on total mileage on general impulsivity measured by BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale after controlling for the effects of age and gender. However, the main effect of total mileage was not significant on any of the factors of BIS-15, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale.

#### 4.2.9.3.Group Differences on Driving Specific Impulsivity

A series of ACOVAs were conducted to examine whether there are differences between the three groups based on total mileage on driving specific impulsivity measured by Impulsive Driver Behavior Scale and Impulsive Driver Scale after controlling for the effects of age and gender.

The main effect of total mileage was significant on driver lack of premeditation ($F(2, 487) = 3.36$, $p < 05$, *Partial Eta Squared* = .01). The Bonferroni adjusted multiple comparisons revealed that the second group having moderate total mileage (*Adjusted M* =1.85, *SD* = .04) had significantly higher scores on driver lack of premeditation than the first group having the lowest total mileage (*Adjusted M* =1.69, *SD* = .05). However, the difference between the first and the third group; and that between the second and the third group was not significant.

The main effect of total mileage was also significant on driver lack of perseverance ($F(2, 487) = 3.15$, $p < 05$, *Partial Eta Squared* = .01). However, the Bonferroni adjusted multiple comparisons revealed no significant differences for the binary combinations of the groups.

The main effect of total mileage was also significant on driver functional impulsivity ($F(2, 489) = 8.58$, $p < 001$, *Partial Eta Squared* = .03). The Bonferroni adjusted multiple comparisons revealed that the second group having moderate total mileage (*Adjusted M* =3.96, *SD* = .05) and the third group having the highest total mileage (*Adjusted M* =4.11, *SD* = .05) had significantly higher scores on driver functional impulsivity than the first group (*Adjusted M* =3.77, *SD* = .05). However, the difference between the second and the third group was not significant.

Finally, the main effect of total mileage was significant on functional impulsivity factor of the Impulsive Driver Scale ($F(2, 481) = 4.12$, $p < 05$, *Partial Eta Squared* = .02). The Bonferroni adjusted multiple comparisons revealed that the second group having moderate total mileage (*Adjusted M* =4.04, *SD* = .04) had significantly higher scores on functional impulsivity factor of the Impulsive Driver Scale than the first group having the lowest total mileage (*Adjusted M* =3.88, *SD* = .05). However, the difference between the first and the third; and that between the second and the third group was not significant.

The results of the group comparisons based on background variables are summarized in Table 4.4.

### 4.2.10.Partial Correlations between Speed Preference and the Study Variables

#### 4.2.10.1.Speed Preference in Intercity Roads

Respondents were asked to indicate their speed preference in intercity roads when the weather and road conditions are normal. The partial correlations between this continuous variable and the study variables by controlling for age, gender and total mileage were examined.

It was found that ordinary violations (*Partial r* = .33, $p < .001$); aggressive violations (*Partial r* = .13, $p < .005$); (general) violations (*Partial r* = .30, $p < .001$); and positive behaviors (*Partial r* = -.10, $p < .05$) factors of DBQ were significantly associated with speed preference in rural roads after controlling for age, gender and total mileage. As the speed preference in intercity roads increased, ordinary violations, aggressive violations and (general) violations increased, while positive behaviors decreased.

Speed preference in rural roads was significantly positively associated with the perceptual-motor skills (*Partial r* = .23, $p < .001$) and negatively associated with safety skills (*Partial r* = -.23, $p < .001$) factors of DSI after age, gender and total mileage were controlled.

Among the general impulsivity measures, speed preference in intercity roads was found to be significantly positively related to UPPS sensation seeking (*Partial r* = .11, $p < .05$) and Dickman`s functional impulsivity (*Partial r* = .17, $p < .001$) after controlling for age, gender and total mileage.

Finally, the partial correlations between speed preference in intercity roads and driver specific impulsivity factor after controlling for age, gender and total mileage were examined. All of the factors of the Impulsive Driver Behavior Scale were found to be significantly positively associated with speed preference in the intercity roads, namely driver urgency (*Partial r* = .37, $p < .001$); driver lack of premeditation (*Partial r* = .13, $p < .005$); driver lack of perseverance (*Partial r* = .16, $p < .001$) and driver functional impulsivity (*Partial r* = .22, $p < .001$). In addition, speed preference in intercity roads was found to be significantly positively associated with both functional impulsivity (*Partial r* = .20, $p < .001$) and dysfunctional impulsivity (*Partial r* = .16, $p < .005$) factors of the Impulsive Driver Scale.

The pattern of these results indicate that driver specific impulsivity measures are more strongly related to speed preference in intercity roads than general impulsivity measures.

#### 4.2.10.2.Speed Preference in Urban Roads

Respondents were asked to indicate their speed preference in urban when the weather and road conditions are normal. The partial correlations between this continuous variable and the study variables by controlling for age, gender and total mileage were examined.

It was found that ordinary violations (*Partial r* = .24, $p < .001$); aggressive violations (*Partial r* = .14, $p < .005$); and (general) violations (*Partial r* = .23, $p < .001$) factors of DBQ were significantly positively associated with speed preference in urban roads after controlling for age, gender and total mileage.

Speed preference in urban roads was significantly positively associated with the perceptual-motor skills (*Partial r* = .12, $p < .05$) and negatively associated with safety skills (*Partial r* = -.18, $p < .001$) factors of DSI after age, gender and total mileage were controlled.

Among the general impulsivity measures, speed preference in urban roads was found to be significantly positively related to only BIS-15 nonplanning impulsivity factor (*Partial r* = .09, $p < .05$) after controlling for age, gender and total mileage.

Finally, the partial correlations between speed preference in urban roads and driver specific impulsivity factor after controlling for age, gender and total mileage were examined. Driver urgency (*Partial r* = .23, $p < .001$) and driver lack of premeditation (*Partial r* = .09, $p < .05$) factors of the Impulsive Driver Behavior Scale were significantly positively associated with speed preference in urban roads. In addition, speed preference in urban roads was found to be significantly positively associated with the dysfunctional impulsivity factor (*Partial r* = .15, $p < .005$) of the Impulsive Driver Scale.

Again, the pattern of these results indicate that driver specific impulsivity measures are more strongly related to speed preference in urban roads than general impulsivity measures. That is, only one factor of one of the three measures of general

impulsivity was significantly associated with speed preference in urban roads, whereas three factors of the two driving specific impulsivity measures were significantly associated with speed preference in urban roads.

**Table 4.4. Summary of significant group differences on the study variables**

| | Gender | Driving Frequency | Total Mileage | # of Accidents | # of Speeding Tickets (Urban) | # of Speeding Tickets (Intercity) | # of Parking Tickets | # of Tickets for Running the Red Light | Overtaking Frequency |
|---|---|---|---|---|---|---|---|---|---|
| Ordinary violations | x | | x | | x | x | | x | |
| Aggressive violations | | | x | x | x | | | x | x |
| (General) violations | x | | x | | x | x | | x | x |
| Errors | | x | | x | x | | x | x | x |
| Lapses | | | | x | x | | x | x | |
| Positive behaviors | | | | | x | | | | |
| Perceptual-motor skills | x | x | x | | | | | | |
| Safety skills | | | x | | x | | | x | x |
| BIS Nonplanning impulsiveness | | | | | x | | x | x | |
| BIS Motor impulsiveness | x | | | | x | x | x | | |
| Attentional impulsiveness | | | | | x | | x | x | |
| UPPS Urgency | | | | | | | x | | |
| UPPS Lack of premeditation | | | | | | | | | |
| UPPS Lack of perseverance | | | | | x | | | | |
| UPPS Sensation seeking | | x | | | | | | | x |

| | Gender | Driving Frequency | Total Mileage | # of Accidents | # of Speeding Tickets (Urban) | # of Speeding Tickets (Intercity) | # of Parking Tickets | # of Tickets for Running the Red Light | Overtaking Frequency |
|---|---|---|---|---|---|---|---|---|---|
| Dickman Functional impulsivity | | | | | | | | | |
| Dickman Dysfunctional impulsivity | x | | | | x | | x | x | |
| Driver Urgency | | x | | x | x | x | | x | |
| Driver Lack of Premeditation | x | | x | | x | | | x | x |
| Driver Lack of Perseverance | | | x | x | x | | x | x | x |
| Driver Functional Impulsivity | x | x | x | | | | | | x |
| Impulsive Driver Scale: | | | | | | | | | |
| Driver Functional Impulsivity | x | x | x | | | | | x | |
| Driver Dysfunctional Impulsivity | | x | | x | x | | | x | x |

### 4.3. Correlations between the Scales

Correlations between the factors of the scales used in the present study are presented in Table 4.5. In the following sections, the associations between the scales will be presented in detail.

#### 4.3.1.Relationship between BIS-15 and Impulsive Driver Behavior Scale

All of the correlations between BIS-15 factors and Impulsive Driver Behavior Scale factors are in the expected direction in general. Nonplanning was significantly positively related to driver urgency ($r$= .219, $p$ < .001), driver lack of premeditation ($r$= .354, $p$ < .001) and driver lack of perseverance (r= .311, $p$ < .001) and significantly negatively related to driver functional impulsivity ($r$= -.239, $p$ < .001). The relationship between BIS nonplanning factor seems to be most strongly associated with the lack of premeditation factor of Impulsive Driver Behavior Scale, both of which reflects a lack of future orientation and planning. This supports the convergent validity of the Impulsive Driver Behavior Scale.

Motor impulsivity was significantly positively related to driver urgency ($r$= .356, $p$ < .001), driver lack of premeditation ($r$= .283, $p$ < .001) and driver lack of perseverance ($r$= .372, $p$ < .001) and was not significantly related to driver functional impulsivity. Motor impulsivity factor of BIS-15 involves acting on impulse, while functional impulsivity reflects a skill involving acting and thinking rapidly, rather than acting without thinking and it does not tell anything about the inability control impulses (Reeve, 2007). Therefore, the nonsignificant relationship between motor impulsivity and driver functional impulsivity factor supports the discriminant validity of the Impulsive Driver Behavior Scale.

Attentional impulsivity was was significantly positively related to driver urgency ($r$= .328, $p$ < .001), driver lack of premeditation ($r$= .291, p < .001) and driver lack of perseverance ($r$= .401, $p$ < .001) and significantly negatively related to driver functional impulsivity ($r$= -.223, $p$ < .001). BIS-15 attentional impulsivity reflects a difficulty in focusing on the task at hand, which is also the theme common in the items of the driver lack of perseverance items in the Impulsive Driver Behavior Scale. Therefore, the observed strongest association of driver lack of perseverance among the four factors of the Impulsive Driver Behavior Scale and BIS

attentional impulsivity supports the convergent validity of the Impulsive Driver Behvior Scale.

**Table 4.5. Correlations between the factors of the scales used in the present study**

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | BIS Nonplanning | 1 | | | | | | | | | | | | |
| **2** | BIS Motor | .415** | 1 | | | | | | | | | | | |
| **3** | BIS Attentional | .536** | .635** | 1 | | | | | | | | | | |
| **4** | UPPS Urgency | .287** | .415** | .465** | 1 | | | | | | | | | |
| **5** | UPPS Lack of Premeditation | .401** | .400** | .377** | .344** | 1 | | | | | | | | |
| **6** | UPPS Lack of Perseverance | .399** | .341** | .409** | .271** | .587** | 1 | | | | | | | |
| **7** | UPS Sensation Seeking | .131** | .315** | .177** | .278** | .190** | .074 | 1 | | | | | | |
| **8** | Dickman Functional | -.048 | .054 | -.144** | -.036 | .102* | -.228** | .323** | 1 | | | | | |
| **9** | Dickman Dysfunctional | .479** | .565** | .557** | .611** | .609** | .435** | .287** | .070 | 1 | | | | |
| **10** | Driver Urgency | .219** | .356** | .328** | .327** | .213** | .219** | .289** | .059 | .324** | 1 | | | |
| **11** | Driver Lack of Premeditation | .354** | .283** | .291** | .264** | .366** | .305** | .110* | -.036 | .358** | .246** | 1 | | |
| **12** | Driver Lack of Perseverance | .311** | .372** | .401** | .402** | .241** | .254** | .222** | -.112* | .401** | .373** | .358** | 1 | |
| **13** | Driver Functional(Behavior) | -.239** | -.069 | -.223** | -.193** | -.242** | -.301** | .185** | .322** | -.163** | .043 | -.422** | -.206** | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

**Table 4.5 Continued**

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **14** | Driver Dysfunctional | .337** | .437** | .483** | .416** | .353** | .349** | .241** | -.075 | .462** | .558** | .471** | .592** | -.286** |
| **15** | Driver Functional | -.242** | -.062 | -.200** | -.117* | -.223** | -.341** | .218** | .336** | -.141** | .063 | -.293** | -.160** | .661** |
| **16** | Ordinary Violations | .278** | .397** | .391** | .361** | .327** | .349** | .329** | .022 | .400** | .609** | .479** | .446** | -.122** |
| **17** | Aggressive Violations | .092* | .254** | .210** | .259** | .170** | .168** | .168** | .013 | .236** | .543** | .192** | .312** | -.083 |
| **18** | (General) Violations | .247** | .394** | .376** | .368** | .311** | .330** | .314** | .022 | .393** | .657** | .437** | .451** | -.123** |
| **19** | Errors | .287** | .345** | .369** | .393** | .300** | .320** | .117* | -.137** | .407** | .290** | .412** | .468** | -.346** |
| **20** | Lapses | .288** | .403** | .435** | .445** | .256** | .274** | .133** | -.152** | .442** | .309** | .419** | .533** | -.316** |
| **21** | Positive Behaviors | -.161** | -.145** | -.176** | -.240** | -.356** | -.331** | -.009 | .122** | -.264** | -.169** | -.416** | -.257** | .340** |
| **22** | Perceptual-motor Skills | -.188** | -.055 | -.196** | -.170** | -.244** | -.313** | .193** | .359** | -.173** | .087 | -.256** | -.173** | .666** |
| **23** | Safety Skills | -.326** | -.239** | -.290** | -.320** | -.415** | -.370** | -.118* | .071 | -.318** | -.502** | -.492** | -.364** | .333** |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

**Table 4.5 Continued**

| | | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **14** | Driver Dysfunctional | 1 | | | | | | | | | |
| **15** | Driver Functional | -.198** | 1 | | | | | | | | |
| **16** | Ordinary Violations | .576** | -.057 | 1 | | | | | | | |
| **17** | Aggressive Violations | .470** | -.015 | .525** | 1 | | | | | | |
| **18** | (General) Violations | .608** | -.050 | .957** | .751** | 1 | | | | | |
| **19** | Errors | .534** | -.255** | .556** | .322** | .543** | 1 | | | | |
| **20** | Lapses | .545** | -.223** | .523** | .381** | .530** | .715** | 1 | | | |
| **21** | Positive Behaviors | -.313** | .243** | -.270** | -.196** | -.277** | -.316** | -.256** | 1 | | |
| **22** | Perceptual-motor Skills | -.221** | .592** | -.034 | -.019 | -.032 | -.308** | -.314** | .271** | 1 | |
| **23** | Safety Skills | -.530** | .301** | -.557** | -.402** | -.568** | -.352** | -.297** | .397** | .362** | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

### 4.3.2.Relationship between UPPS Impulsive Behavior Scale and Impulsive Driver Behavior Scale

The strongest association of driver urgency factor of the Impulsive Driver Behavior factor was found to be with the urgency factor of UPPS Impulsive Behavior Scale ($r$= .327, $p$ < .001), supporting the convergent validity of this newly developed scale. The relationships between driver urgency and the other factors of UPPS, namely lack of premeditation ($r$= .213, $p$ < .001), lack of perseverance ($r$= .219, $p$ < .001) and sensation seeking ($r$= .289, $p$ < .001), were also positive and significant. This is an also expected finding since the relationships between UPSS factors are mostly moderate and significant (Whiteside & Lynam, 2001).

Similarly, the strongest association of driver lack of premeditation factor of the Impulsive Driver Behavior Scale was found to be with the corresponding lack of premeditation factor of UPPS Impulsive Behavior Scale ($r$= .366, $p$ < .001), supporting the convergent validity of this newly developed scale. The relationships between driver lack of premeditation of the Impulsive Driver Behavior Scale and and the other factors of UPPS, namely urgency ($r$= .264, $p$ < .001), lack of perseverance ($r$= .305, $p$ < .001) and sensation seeking ($r$= .110, $p$ < .001), were also positive and significant.

The lack of perseverance factor of the Impulsive Driver Behavior Scale was found to be significantly positively correlated with UPPS urgency ($r$= .402, $p$ < .001), UPPS lack of premeditation ($r$= .241, $p$ < .001), UPPS lack of perseverance ($r$= .254, $p$ < .001) and UPPS sensation seeking ($r$= .222, $p$ < .001). It is not clear why this factor was correlated with UPPS urgency more strongly than its corresponding UPPS factor (lack of perseverance).

Finally, driver functional impulsivity factor of the Impulsive Driver Behavior Scale was significantly negatively correlated with UPPS urgency ($r$= -.193, $p$ < .001), UPPS lack of premeditation ($r$= -.242, $p$ < .001), UPPS lack of perseverance ($r$= -.301, $p$ < .001); and significantly positively correlated with sensation seeking ($r$= .185, $p$ < .001). The items of the functional driver impulsivity subscale involves a rapid information processing theme especially in the case of an emergency while driving (e.g., “I can make my mind rapidly in the case of an emergency (while driving)”; “In the case of an emergency in traffic, I rapidly check the environment for

a safe spot to run to while slowing down at the same time"). UPPS lack of perseverance reflects a lack of attention necessary to complete the task at hand (Whiteside & Lynam, 2001), and this attentional or cognitive component of these subscales may be the reason of the strongest link of driver functional impulsivity with UPPS perseverance.

### 4.3.3. Relationship between BIS-15 and Impulsive Driver Scale

Nonplanning factor of BIS-15 was significantly positively related to dysfunctional impulsivity factor ($r$= .337, $p$ < .001) and significantly negatively related to functional impulsivity factor of Impulsive Driver Scale ($r$= -.242, $p$ < .001). Motor impulsivity factor of BIS-15 was significantly positively related to dysfunctional impulsivity factor (r= .437, p < .001) and was not significantly related to functional impulsivity factor of Impulsive Driver Scale. Attentional impulsivity factor of BIS-15 was significantly positively related to dysfunctional impulsivity factor ($r$= .483, $p$ < .001) and significantly negatively related to functional impulsivity factor of Impulsive Driver Scale ($r$= -.200, $p$ < .001).

A similar pattern regarding the direction and significance of the correlation coefficients between nonplanning and attentional impulsivity factors of BIS-15 with functional and dysfunctional impulsivity factors of Impulsive Driver Behavior has been observed. The nonplanning impulsivity factor is a higher order factor comprising of self-control and cognitive complexity (Patton et al., 1995) and attentional impulsivity higher order factor is a higher order factor comprising of attention and cognitive instability. That is, both of these higher order factors involve a component related to cognitive processes, whereas the motor impulsivity factor does not. This component regarding the cognitive processes may be the reason why these two factors (nonplanning and attentional impulsivity) have been found to be significantly negatively related to functional impulsivity, which involves a rapid thinking component, whereas motor impulsivity was not. With regard to the relationships between dysfunctional impulsivity factor of Impulsive Driver Scale and the three BIS-15 factors, it is reasonable that all of the these three factors have significant positive correlations with the dysfunctional impulsivity factor, since these three factors reflect the general notion of impulsivity in the literature as a negative

and dysfunctional personality trait. Hence, all of these findings provide support for the validity of Impulsive Driver Scale.

### 4.3.4. Relationship between BIS-15 and Dickman Functional/Dysfunctional Impulsivity Scale

Nonplanning factor of BIS-15 was significantly positively related to dysfunctional impulsivity factor ($r$= .479, $p$ < .001) and nonsignificantly related to functional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale. Motor impulsivity factor of BIS-15 was significantly positively related to dysfunctional impulsivity factor ($r$= .565, $p$ < .001) and was not significantly related to functional impulsivity factor of Impulsive Driver Scale. Attentional impulsivity factor of BIS-15 was significantly positively related to dysfunctional impulsivity factor ($r$= .557, $p$ < .001) and significantly negatively related to functional impulsivity factor of Impulsive Driver Scale ($r$= -.144, $p$ < .005). It is reasonable that Dysfunctional impulsivity factor, reflecting the general negative view of impulsivity trait in the literature had strong positive correlations between all of the BIS-15 factors, all of which reflecting the negative and dysfunctional view of impulsivity as a personality trait.

### 4.3.5. Relationship between UPPS Impulsive Behavior Scale and Impulsive Driver Scale

The functional impulsivity factor of Impulsive Driver scale was significantly negatively related to UPPS urgency ($r$= -.117, $p$ < .05); UPPS lack of premeditation ($r$= -.223, $p$ < .001); UPPS lack of perseverance ($r$= -.341, $p$ < .001); and significantly positively related to UPPS sensation seeking ($r$= .218, $p$ < .001).

The dysfunctional impulsivity factor of Impulsive Driver scale was significantly positively related to UPPS urgency ($r$= .416, $p$ < .05); UPPS lack of premeditation ($r$= .353, $p$ < .001); UPPS lack of perseverance ($r$= .349, $p$ < .001); and UPPS sensation seeking ($r$= .241, $p$ < .001).

### 4.3.6. Relationship between Dickman Functional/Dysfunctional Impulsivity Scale and Impulsive Driver Scale

The functional impulsivity factor of Impulsive Driver scale was significantly positively related to the functional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale ($r$= .336, $p$ < .001) and significantly

negatively related to the dysfunctional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale ($r$= -.141, $p$ < .001).

The dysfunctional impulsivity factor of Impulsive Driver scale was significantly positively related to the dysfunctional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale ($r$= .462, $p$ < .001) and was not significantly to the functional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale ($r$= -.075, ns). The stronger associations between the corresponding factors in the two scales (functional & functional driver; dysfunctional & dysfunctional driver) support the validity of both the Turkish adaptation of the Dickman Functional/Dysfunctional Impulsivity Scale and the newly developed Driver Impulsivity Scale.

### 4.3.7. Relationship between Impulsive Driver Behavior and Impulsive Driver Scale

The functional impulsivity factor of Impulsive Driver scale was significantly positively related to the driver functional impulsivity factor of Impulsive Driver Behavior Scale ($r$= .661, $p$ < .001), significantly negatively related to driver lack of premeditation ($r$= -.293, $p$ < .001) and driver lack of perseverance ($r$= -.160, $p$ < .001), but was not significantly related to driver urgency ($r$= -.063, ns).

The dysfunctional impulsivity factor of Impulsive Driver Scale was significantly positively related to driver urgency ($r$= .558, $p$ < .001), driver lack of premeditation ($r$= .471, $p$ < .001) and driver lack of perseverance ($r$= .592, $p$ < .001), and significantly negatively related to driver functional impulsivity ($r$= -.286, $p$ < .001).

It was expected that the driver dysfunctional impulsivity factor comprising of the core elements of general impulsivity construct, namely difficulty in controlling impulses (urgency); lack of future orientation and acting without thinking (lack of premeditation) and a difficulty focusing on the task at hand (lack of perseverance) would be more strongly related to these three factors of the Impulsive Driver Behavior Scale than the driver functional impulsivity factor, which was the case in the pattern of these correlations. In addition, the functional impulsivity factor of the Driver Impulsivity Scale was found to be most strongly associated with the corresponding functional impulsivity factor of the Impulsive Driver Behavior Scale,

supporting the convergent validity of both of these newly developed scales. In addition, the functional impulsivity factor of Impulsive Driver Scale was found to be nonsignificantly related to the urgency factor of Impulsive Driver Behavior Scale, which mostly reflects a difficulty in impulse control while driving. This was also discussed in Section 1 that functional impulsivity construct does not tell anything about impulse control (Reeve, 2007). Therefore, this finding supports the discriminant validity of these scales.

### 4.3.8. Relationship between UPPS Impulsive Behavior Scale and Dickman Functional/Dysfunctional Impulsivity Scale

The functional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale was nonsignificantly negatively related to UPPS urgency ($r$= -.036, *ns*); significantly positively related to UPPS lack of premeditation ($r$= .102, $p < .05$) and UPPS sensation seeking ($r$= .323, $p < .001$); and significantly negatively related to UPPS lack of perseverance ($r$= -.228, $p < .001$).

The dysfunctional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale was significantly positively related to UPPS urgency ($r$= .611, $p < .001$); UPPS lack of premeditation ($r$= .609, $p < .001$); UPPS lack of perseverance ($r$= .435, $p < .001$); and UPPS sensation seeking ($r$= .287, $p < .001$).

### 4.3.9. Relationship between DBQ and (General) Impulsivity (BIS-15, UPPS and Dickman)

All of the three factors of BIS-15 was significantly positively related to the ordinary violations, aggressive violations, violations (general), errors and lapses with a pattern involving the strongest association of motor impulsivity factor (among the three BIS-15 factors) with violations (ordinary violations, aggressive violations and general violation) and the strongest association of attentional impulsivity with errors and lapses. This pattern is a reasonable one since motor impulsivity reflects a general difficulty in controlling impulses, which is more strongly related to driver violations than errors and lapses; and attentional impulsivity is related to attentional and cognitive mechanisms which is involved in driver errors and lapses.

Moreover, all of the four factors of UPPS Impulsive Behavior Scale, namely urgency, lack of premeditation, lack of perseverance and sensation seeking, were significantly positively related to aggressive violations, ordinary violations,

violations (general), errors and lapses. In addition, all of the UPPS factors, except sensation seeking, were significantly negatively related to DBQ positive behavior subscale. An observable pattern emerged in terms of the strength of associations of UPPS factors with ordinary violations, violations (general), errors and lapses, such that the largest correlation coefficient was that of urgency, followed by lack of perseverance and then lack of premeditation. However, it would be reasonable to expect that lapses, involving cognitive processes, would be more strongly associated with lack of perseverance, which involves attentional mechanisms, but, it was not the case. But, this expectation was confirmed when the newly developed Impulsive Driver behaviour Scale is used, which supports the validity of the Impulsive Driver behavior Scale.

Finally, the functional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale was found to be significantly negatively related to only errors ($r$= -.137, $p$ < .005) and lapses ($r$= -.152, $p$ < .001); and positively related to DBQ positive behaviors subscale ($r$= .122, $p$ < .01). However, the dysfunctional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale was found to be significantly related to all of the DBQ factors, namely aggressive violations ($r$= .400, $p$ < .001), ordinary violations ($r$= .236, $p$ < .001), violations (general) ($r$= .393, $p$ < .001), errors ($r$= .407, $p$ < .001) lapses ($r$= .442, $p$ < .001) and negatively related to positive behaviors ($r$= -.264, $p$ < .001). This difference in the correlations between functional and dysfunctional impulsivity with DBQ factors is in line woth the expectations.

### 4.3.10. Relationship between DBQ and Impulsive Driver Behavior Scale

Driver urgency was significantly positively correlated with ordinary violations ($r$= .609, $p$ < .001); aggressive violations ($r$= .543, $p$ < .001); violations (general) ($r$= .657, $p$ < .001); errors ($r$= .290, $p$ < .001); lapses ($r$= .309, $p$ < .001); but, significantly negatively related to DBQ positive behaviors subscale ($r$= -.169, $p$ < .001).

Driver lack of premeditation was significantly positively correlated with ordinary violations ($r$= .479, $p$ < .001); aggressive violations ($r$= .192, $p$ < .001); violations (general) ($r$= .437, $p$ < .001); errors ($r$= .412, $p$ < .001); lapses ($r$= .419, $p$

< .001); but, significantly negatively related to DBQ positive behaviors subscale (*r*= -.416, *p* < .001).

Driver lack of perseverance was significantly positively correlated with ordinary violations (*r*= .446, *p* < .001); aggressive violations (*r*= .312, *p* < .001); violations (general) (*r*= .451, *p* < .001); errors (*r*= .468, *p* < .001); lapses (*r*= .533, *p* < .001); but, significantly negatively related to DBQ positive behaviors subscale (*r*= -.257, *p* < .001). The association between lapses and driver lack of perseverance is the strongest one, which supports the convergent validity of the Impulsive Driver Behavior Scale., since driver lack of perseverance is related to lack of attention and difficulty focusing on the driving task, which should obviously be related to lapses.

Finally, driver functional impulsivity factor of the Impulsive Driver Behavior Scale was significantly negatively correlated with ordinary violations (*r*= -.122, *p* < .01); violations (general) (*r*= -.123, *p* < .01); errors (*r*= -.346, *p* < .001); lapses (*r*= -.316, *p* < .001); but, significantly positively related to DBQ positive behaviors subscale (*r*= .340, *p* < .001) and nonsignificantly related to aggressive violations (.*r*= -.083, ns).

### 4.3.11. Relationship between DBQ and Impulsive Driver Scale

The driver functional impulsivity factor of Impulsive Driver Scale was not significantly related to ordinary violations, aggressive violations and violations (general) factors of DBQ, while it was significantly negatively related to errors (*r*= -.255, *p* < .001) and lapses (*r*= -.223, *p* < .001); and positively related to DBQ positive behaviors (*r*= .243, *p* < .001).

The driver dysfunctional impulsivity factor of Impulsive Driver Scale was found to be positively related to ordinary violations (*r*= .576, *p* < .001), aggressive violations (*r*= .470, *p* < .001), violations (general) (*r*= .608, *p* < .001), errors (*r*= .534, *p* < .001), and lapses (*r*= .545, *p* < .001), while it was negatively related to DBQ positive behaviors (*r*= -.313, *p* < .001).

### 4.3.12. Relationship between DSI and (General) Impulsivity (BIS, UPPS and Dickman)

All of the three factors of BIS-15 was significantly negatively related to safety skills, while only two of them, namely attentional (*r*= -.196, *p* < .001) and nonplanning (*r*= -.188, *p* < .001) impulsivity were found to be significantly negatively related to

perceptual-motor skills. As discussed in section 3, both of the attentional and nonplanning impulsivity factors a component related to cognitive processes, whereas the motor impulsivity factor does not. Hence, cognitive component may be the reason why these two factors (nonplanning and attentional impulsivity) were found to be significantly related to perceptual-motor skills, which involves information processing and motor skills, whereas motor impulsivity, reflecting the difficulty in impulse control, was not.

Furthermore, all factors of the UPPS Impulsive Behavior Scale were found to be significantly related perceptual-motor skills. Urgency ($r$= -.170, $p$ < .001), lack of premeditation ($r$= -.244, $p$ < .001), lack of perseverance ($r$= -.313, $p$ < .001) were negatively; and sensation seeking ($r$= .193, $p$ < .001) was positively related to perceptual-motor skills. In addition, all of the factors of UPPS Impulsive Behavior Scale, namely urgency ($r$= -.320, $p$ < .001), lack of premeditation ($r$= -.415, $p$ < .001), lack of perseverance ($r$= -.370, $p$ < .001) and sensation seeking ($r$= -.118, $p$ < .05) were found to be significantly negatively related to safety skills. It can be observed that the strength of the associations between urgency, lack of perseverance and lack of premeditation with perceptual-motor skills are smaller than that with safety skills, as expected.

Finally, the functional impulsivity factor of Dickman Functional/Dysfunctional Impulsivity Scale was found to be positively related to perceptual-motor skills ($r$= .359, $p$ < .001) and not related to safety skills. However, dysfunctional impulsivity was negatively related to both perceptual-motor ($r$= -.173, $p$ < .001) and safety skills ($r$= -.173, $p$ < .001). It was expected that functional impulsivity would be less strongly associated with safety skills than with perceptual-motor skills, and would reveal a weaker relationship with safety skills than dysfunctional impulsivity would have. In addition, dysfunctional impulsivity was expected to have a stronger association with safety skills than perceptual-motor skills. By these correlation coefficients presented, it can be observed that all of these expectations have been met.

### 4.3.13. Relationship between DSI and Driver Impulsivity Impulsive Driver Behavior Scale

Driver urgency was not related to perceptual-motor skills, whereas it was significantly negatively related to safety skills ($r$= -.502, $p$ < .001), as expected.

Driver lack of premeditation was significantly negatively related to both perceptual-motor skills ($r$= -.256, $p$ < .001).and safety skills ($r$= -.492, $p$ < .001), having a much stronger association with the safety skills, which was the expected pattern.

Driver lack of perseverance was also significantly negatively related to both perceptual-motor skills ($r$= -.173, $p$ < .001).and safety skills ($r$= -.364, $p$ < .001), having a much stronger association with the safety skills, again meeting the expectations.

Finally, driver functional impulsivity factor of the Impulsive Driver Behavior Scale was found to be significantly positively associated with both perceptual-motor skills ($r$= .666, $p$ < .001) and safety skills ($r$= .333, $p$ < .001), having a much stronger relationship with the perceptual-motor skills as expected.

### 4.3.14. Relationship between DSI and Impulsive Driver Scale

The driver functional impulsivity factor of Impulsive Driver Scale was found to be significantly positively associated with both perceptual-motor skills ($r$= .592, $p$ < .001) and safety skills ($r$= .301, $p$ < .001), having a much stronger relationship with the perceptual-motor skills as expected.

The driver dysfunctional impulsivity factor of Impulsive Driver Scale was found to be significantly negatively associated with both perceptual-motor skills ($r$= -.221, $p$ < .001) and safety skills ($r$= -.530, $p$ < .001), having a much stronger relationship with the safety skills which was the expected pattern.

## 4.4. Regression Analyses

In all of the analyses presented in this section, age, gender and total mileage were entered the analysis in the first step as control variables. The results of hierarchical regression analyses with age, gender and total mileage entered in the first step and the factors of each impulsivity scale are presented in Table 4.6 to Table 4.11; and Table 4.16-17. It should be noted that separate analyses were conducted with each of the impulsivity scales, but the results of these separate analyses are presented in the

same table for the ease of comparison, and that the first step variables and parameters were already the same in each analyses.

### 4.4.1. BIS-15 predicting DBQ

A series of hierarchical regression analyses were conducted with BIS-15 factors, namely nonplanning, motor and attentional impulsivity as the predictors and with one of the DBQ factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 31.00, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .12, $F_{change}$ = 25.02, $p$ < .001) explained a significant amount of variance in the ordinary violations factor of DBQ beyond that explained by the first step. All of the three factors of BIS-15, namely nonplanning ($\beta$= .10, $p$ < .05), motor ($\beta$= .14, $p$ < .01) and attentional ($\beta$= .18, $p$ < .005) impulsivity factors were found to be significantly positively related to ordinary violations.

In the second analysis, the DV was aggressive violations factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.90, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .03, $F_{change}$ = 5.82, $p$ < .005) explained a significant amount of variance in the aggressive violations factor beyond that explained by the first step. Only motor impulsivity ($\beta$= .15, $p$ < .05) was found to be significantly positively related to aggressive violations, the other two factors, namely nonplanning and attentional impulsivity were not significantly related to aggressive violations.

Third, the analysis was repeated with violations (general) factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 30.70, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .11, $F_{change}$ = 22.07, $p$ < .001)explained a significant amount of variance in the (general) violations factor beyond that explained by the first step. Motor impulsivity ($\beta$= .16, $p$ < .005) and attentional impulsivity ($\beta$= .17, $p$ < .005) were found to be significantly positively related to (general) violations, while nonplanning impulsivity was not significantly related to (general) violations.

Fourth, the analysis was conducted with errors factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 12.09, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .12, $F_{change}$ = 23.60, $p$ < .001) explained a significant amount of variance in the errors factor beyond that explained by the first step. All of the three factors of BIS-15, namely nonplanning ($\beta$= .12, $p$ < .05), motor ($\beta$= .11, $p$ < .05) and attentional ($\beta$= .20, $p$ < .005) impulsivity factors were found to be significantly positively related to errors.

In the fifth analysis, the DV was lapses factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 8.10, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .18, $F_{change}$ = 35.15, $p$ < .001) explained a significant amount of variance in the lapses factor beyond that explained by the first step. Motor impulsivity ($\beta$= .18, $p$ < .005) and attentional impulsivity ($\beta$= .26, $p$ < .001) were found to be significantly positively related to lapses, while nonplanning impulsivity was not significantly related to lapses.

Finally, the analysis was conducted with DBQ positive behaviors factor as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 11.14, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .02, $F_{change}$ = 4.04, $p$ < .01) explained a significant amount of variance in the positive behaviors factor beyond that explained by the first step. Only nonplanning impulsivity was found to be significantly negatively related to DBQ positive behaviors ($\beta$= -.12, $p$ < .05), while motor impulsivity and attentional impulsivity were not significantly related to DBQ positive behaviors.

### 4.4.2. UPPS predicting DBQ

A series of hierarchical regression analyses were conducted with UPPS Impulsive Behavior Scale factors, namely urgency, lack of premeditation, lack of perseverance and sensation seeking as the predictors and with one of the DBQ factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 28.73, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ =

.14, $F_{change}$ = 21.42, $p$ < .001) explained a significant amount of variance in the ordinary violations factor of DBQ beyond that explained by the first step. Urgency ($\beta$= .20, $p$ < .001), lack of perseverance ($\beta$= .18, $p$ < .001) and sensation seeking ($\beta$= .17, $p$ < .001) were found to be significantly positively related to ordinary violations, while lack of premeditation was not significantly related to ordinary violations.

In the second analysis, the DV was aggressive violations factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.01, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ = .05, $F_{change}$ = 5.52, $p$ < .001) explained a significant amount of variance in the aggressive violations factor of DBQ beyond that explained by the first step. Among the four factors of UPPS, only urgency was found to be significantly related to aggressive violations ($\beta$= .19, $p$ < .001).

Third, the analysis was repeated with violations (general) factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 28.46, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ = .13, $F_{change}$ = 19.34, $p$ < .001) explained a significant amount of variance in the (general) violations factor of DBQ beyond that explained by the first step. Urgency ($\beta$= .22, $p$ < .001), lack of perseverance ($\beta$= .16, $p$ < .005) and sensation seeking ($\beta$= .15, $p$ < .005) were found to be significantly positively related to (general) violations, while lack of premeditation was not significantly related to (general) violations.

Fourth, the analysis was conducted with errors factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 11.26, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ = .16, $F_{change}$ = 21.98, $p$ < .001) explained a significant amount of variance in the errors factor of DBQ beyond that explained by the first step. Urgency ($\beta$= .31, $p$ < .001) and lack of perseverance ($\beta$= .16, $p$ < .005) were found to be significantly positively related to errors, while lack of premeditation and sensation seeking were not significantly related to errors.

In the fifth analysis, the DV was lapses factor of DBQ. After age, gender and total mileage controlled in the first step ($R^2$ = .05, $F_{change}$ = 7.51, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ = .18, $F_{change}$ = 25.30, $p$ < .001)

explained a significant amount of variance in the lapses factor of DBQ beyond that explained by the first step. Again, urgency ($\beta$= .39, $p$ < .001) and lack of perseverance ($\beta$= .13, $p$ < .05) were found to be significantly positively related to errors, while lack of premeditation and sensation seeking were not significantly related to errors.

Finally, the analysis was conducted with DBQ positive behaviors factor as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 10.33, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ = .13, $F_{change}$ = 17.58, $p$ < .001) explained a significant amount of variance in the positive behaviors factor of DBQ beyond that explained by the first step. Urgency ($\beta$= -.13, $p$ < .01), lack of premeditation ($\beta$= -.22, $p$ < .001) and lack of perseverance ($\beta$= -.14, $p$ < .05) were found to be significantly negatively related to DBQ positive behaviors, while sensation seeking ($\beta$= .13, $p$ < .01) was positively related to DBQ positive beahviors.

### 4.4.3. Dickman Functional/Dysfunctional Impulsivity Scale predicting DBQ

A series of hierarchical regression analyses were conducted with functional and dysfunctional impulsivity factors of Dickman Functional/Dysfunctional Impulsivity Scale as the predictors and with one of the DBQ factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ =29.87, $p$ < .001), functional and dysfunctional impulsivity entered in the second step ($R^2_{change}$ = .10, $F_{change}$ =29.03, $p$ < .001) explained a significant amount of variance in the ordinary violations factor of DBQ beyond that explained by the first step. Dysfunctional impulsivity ($\beta$= .32, $p$ < .001) was significantly positively associated with ordinary violations, whereas functional impulsivity was not.

In the second analysis, the DV was aggressive violations factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.48, $p$ < .001), functional and dysfunctional impulsivity entered in the second step ($R^2_{change}$ = .03, $F_{change}$ = 7.86, $p$ < .001) explained a significant amount of variance in the aggressive violations factor of DBQ beyond that explained by the first

step. Again, dysfunctional impulsivity ($\beta$= .18, $p$ < .001) was significantly positively associated with aggressive violations, whereas functional impulsivity was not.

Third, the analysis was repeated with violations (general) factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 29.58, $p$ < .001), functional and dysfunctional impulsivity entered in the second step ($R^2_{change}$ = .09, $F_{change}$ = 27.53, $p$ < .001) explained a significant amount of variance in the (general) violations factor of DBQ beyond that explained by the first step. Parallel with ordinary and aggressive violations, dysfunctional impulsivity ($\beta$= .31, $p$ < .001) was significantly positively associated with (general) violations, whereas functional impulsivity was not.

Fourth, the analysis was conducted with errors factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 11.70, $p$ < .001), functional and dysfunctional impulsivity entered in the second step ($R^2_{change}$ = .16, $F_{change}$ = 44.79, $p$ < .001) explained a significant amount of variance in the errors factor of DBQ beyond that explained by the first step. Functional impulsivity was negatively ($\beta$= -.18, $p$ < .001) and dysfunctional impulsivity was positively ($\beta$= .37, $p$ < .001) associated with errors.

In the fifth analysis, the DV was lapses factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 7.80, $p$ < .001), functional and dysfunctional impulsivity entered in the second step ($R^2_{change}$ = .20, $F_{change}$ = 58.36, $p$ < .001) explained a significant amount of variance in the lapses factor of DBQ beyond that explained by the first step. Again, functional impulsivity was negatively ($\beta$= -.19, $p$ < .001) and dysfunctional impulsivity was positively ($\beta$= .43, $p$ < .001) associated with lapses.

Finally, the analysis was conducted with DBQ positive behaviors factor as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 10.74, $p$ < .001), functional and dysfunctional impulsivity entered in the second step ($R^2_{change}$ = .07, $F_{change}$ = 17.36, $p$ < .001) explained a significant amount of variance in the positive behaviors factor of DBQ beyond that explained by the first step. Functional impulsivity was positively ($\beta$= .15, $p$ < .005) and dysfunctional impulsivity was negatively ($\beta$= -.23, $p$ < .001) associated with DBQ positive behaviors.

### 4.4.4. Impulsive Driver Behavior Scale predicting DBQ

A series of hierarchical regression analyses were conducted with Impulsive Driver Behavior Scale factors, namely driver urgency, driver lack of premeditation, driver lack of perseverance and driver functional impulsivity as the predictors and with one of the DBQ factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 31.00, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .37, $F_{change}$ = 93.86, $p$ < .001) explained a significant amount of variance in the ordinary violations factor of DBQ beyond that explained by the first step. Driver urgency ($\beta$= .42, $p$ < .001), driver lack of premeditation ($\beta$= .28, $p$ < .001), driver lack of perseverance ($\beta$= .17, $p$ < .001) were found to be significantly positively related to ordinary violations, while driver functional impulsivity was not significantly related to ordinary violations.

In the second analysis, the DV was aggressive violations factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.90, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .25, $F_{change}$ = 41.67, $p$ < .001) explained a significant amount of variance in the aggressive violations factor of DBQ beyond that explained by the first step. Driver urgency ($\beta$= .48, $p$ < .001) and driver lack of perseverance ($\beta$= .11, $p$ < .05) were found to be significantly positively related to aggressive violations, while driver lack of premeditation and driver functional impulsivity was not significantly related to aggressive violations.

Third, the analysis was repeated with (general) violations factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 30.70, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .40, $F_{change}$ = 104.58, $p$ < .001) explained a significant amount of variance in the (general) violations factor of DBQ beyond that explained by the first step. Driver urgency ($\beta$= .49, $p$ < .001), driver lack of premeditation ($\beta$= .21, $p$ < .001), driver lack of perseverance ($\beta$= .17, $p$ < .001) were found to be significantly positively related to (general) violations, while driver functional impulsivity was not significantly related to (general) violations.

Fourth, the analysis was conducted with errors factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 12.09, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .29, $F_{change}$ = 51.64, $p$ < .001) explained a significant amount of variance in the errors factor of DBQ beyond that explained by the first step. Driver urgency ($\beta$= .11, $p$ < .05), driver lack of premeditation ($\beta$= .13, $p$ < .005), driver lack of perseverance ($\beta$= .32, $p$ < .001) were found to be significantly positively related to errors, while driver functional impulsivity ($\beta$= -.24, $p$ < .001) was negatively significantly related to errors.

In the fifth analysis, the DV was lapses factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 8.10, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .33, $F_{change}$ = 61.06, $p$ < .001) explained a significant amount of variance in the lapses factor of DBQ beyond that explained by the first step. Parallel with the associations with errors factor of DBQ, driver urgency ($\beta$= .10, $p$ < .05), driver lack of premeditation ($\beta$= .17, $p$ < .001), driver lack of perseverance ($\beta$= .39, $p$ < .001) were found to be significantly positively related to lapses, while driver functional impulsivity ($\beta$= -.16, $p$ < .001) was negatively significantly related to lapses.

Finally, the analysis was conducted with DBQ positive behaviors factor as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .07, $F_{change}$ = 11.14, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .18, $F_{change}$ = 28.21, $p$ < .001) explained a significant amount of variance in the positive behaviors factor of DBQ beyond that explained by the first step. Driver lack of premeditation ($\beta$= -.27, $p$ < .001) was negatively and driver functional impulsivity ($\beta$= .20, $p$ < .001) was positively associated with DBQ positive behaviors, while driver urgency and driver lack of perseverance were not significantly associated with DBQ positive behaviors.

### 4.4.5. Impulsive Driver Scale predicting DBQ

A series of hierarchical regression analyses were conducted with functional and dysfunctional impulsivity factors of Impulsive Driver Scale as the predictors and

with one of the DBQ factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ =31.00, $p$ < .001), functional and dysfunctional impulsivity factors of Impulsive Driver Scale entered in the second step ($R^2_{change}$ = .23, $F_{change}$ =88.06, $p$ < .001) explained a significant amount of variance in the ordinary violations factor of DBQ beyond that explained by the first step. Dysfunctional impulsivity ($\beta$= .51, $p$ < .001) was significantly positively associated with ordinary violations, whereas functional impulsivity was not. This pattern is the same with Dickman (general functional and dysfunctional impulsivity), but here the association between dysfunctional impulsivity and ordinary violations is much stronger, as expected. This supports the usage of a driving specific personality (impulsivity) scale.

In the second analysis, the DV was aggressive violations factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.90, $p$ < .001), functional and dysfunctional impulsivity factors of Impulsive Driver Scale entered in the second step ($R^2_{change}$ = .17, $F_{change}$ = 51.93, $p$ < .001) explained a significant amount of variance in the aggressive violations factor of DBQ beyond that explained by the first step. Again, dysfunctional impulsivity ($\beta$= .44, $p$ < .001) was significantly positively associated with aggressive violations, whereas functional impulsivity was not.

Third, the analysis was repeated with violations (general) factor of DBQ as the DV. After age, gender and total mileage were controlled in the first step ($R^2$ = .17, $F_{change}$ = 30.70, $p$ < .001), functional and dysfunctional impulsivity factors of Impulsive Driver Scale entered in the second step ($R^2_{change}$ = .26, $F_{change}$ = 105.97, $p$ < .001) explained a significant amount of variance in the (general) violations factor of DBQ beyond that explained by the first step. Parallel with ordinary and aggressive violations, dysfunctional impulsivity ($\beta$= .55, $p$ < .001) was significantly positively associated with (general) violations, whereas functional impulsivity was not.

Fourth, the analysis was conducted with errors factor of DBQ as the DV. After age, gender and total mileage controlled in the first step ($R^2$ = .07, $F_{change}$ = 12.09, $p$ < .001), functional and dysfunctional impulsivity factors of Impulsive Driver Scale entered in the second step ($R^2_{change}$ = .26, $F_{change}$ = 87.85, $p$ < .001)

explained a significant amount of variance in the errors factor of DBQ beyond that explained by the first step. Functional impulsivity was negatively ($\beta$= -.17, $p$ < .001) and dysfunctional impulsivity was positively ($\beta$= .46, $p$ < .001) associated with errors.

In the fifth analysis, the DV was lapses factor of DBQ. After age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 8.10, $p$ < .001), functional and dysfunctional impulsivity factors of Impulsive Driver Scale entered in the second step ($R^2_{change}$ = .27, $F_{change}$ = 90.04, $p$ < .001) explained a significant amount of variance in the lapses factor of DBQ beyond that explained by the first step. Again, functional impulsivity was negatively ($\beta$= -.12, $p$ < .005) and dysfunctional impulsivity was positively ($\beta$= .50, $p$ < .001) associated with lapses.

Finally, the analysis was conducted with DBQ positive behaviors factor as the DV. After the demographic and mileage related variables were controlled in the first step ($R^2$ = .07, $F_{change}$ = 11.14, $p$ < .001), functional and dysfunctional impulsivity factors of Impulsive Driver Scale entered in the second step ($R^2_{change}$ = .10, $F_{change}$ = 27.67, $p$ < .001) explained a significant amount of variance in the positive behaviors factor of DBQ beyond that explained by the first step. Functional impulsivity was positively ($\beta$= .20, $p$ < .001) and dysfunctional impulsivity was negatively ($\beta$= -.22, $p$ < .001) associated with DBQ positive behaviors.

**Table 4.6. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| **DV: DBQ Ordinary Violations** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .167 | .167 | | .000 |
| Age | | | -.413 | .000 |
| Gender | | | .200 | .000 |
| Total Mileage | | | -.002 | .959 |
| 2nd Step: BIS-15 Factors | .284 | .117 | | .000 |
| Nonplanning Impulsiveness | | | .098 | .040 |
| Motor Impulsiveness | | | .141 | .008 |
| Attentional Impulsiveness | | | .184 | .001 |
| 2nd Step:UPPS Factors | .306 | .139 | | .000 |
| Urgency | | | .200 | .000 |
| Lack of Premeditation | | | .064 | .215 |

| | | | | |
|---|---|---|---|---|
| Lack of Perseverance | | | .183 | .000 |
| Sensation Seeking | | | .171 | .000 |
| 2nd Step: Dickman Scale | .263 | .096 | | 0.000 |
| Functional Impulsivity | | | -.026 | .521 |
| Dysfunctional Impulsivity | | | .321 | .000 |
| 2nd Step: Impulsive Driver Behavior Scale | .541 | .374 | | .000 |
| Driver Urgency | | | .417 | .000 |
| Driver Lack of Premeditation | | | .280 | .000 |
| Driver Lack of Perseverance | | | .168 | .000 |
| Driver Functional Impulsivity | | | .013 | .725 |
| 2nd Step:Impulsive Driver Scale | .396 | .230 | | .000 |
| Driver Functional Impulsivity | | | .035 | .350 |
| Driver Dysfunctional Impulsivity | | | .510 | .000 |

**Table 4.7. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| **DV: DBQ Aggressive Violations** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | -.287 | .000 |
| Gender | | | .035 | .458 |
| Total Mileage | | | .006 | .891 |
| 2nd Step: BIS-15 Factors | .111 | .034 | | .001 |
| Nonplanning Impulsiveness | | | -.026 | .625 |
| Motor Impulsiveness | | | .149 | .012 |
| Attentional Impulsiveness | | | .077 | .219 |
| 2nd Step: UPPS Factors | .123 | .045 | | .000 |
| Urgency | | | .188 | .000 |
| Lack of Premeditation | | | .015 | .793 |
| Lack of Perseverance | | | .044 | .454 |
| Sensation Seeking | | | .042 | .403 |
| 2nd Step: Dickman Scale | .109 | .031 | | .000 |
| Functional Impulsivity | | | -.014 | .758 |
| Dysfunctional Impulsivity | | | .184 | .000 |
| 2nd Step: Impulsive Driver Behavior Scale | .323 | .246 | | .000 |
| Driver Urgency | | | .478 | .000 |
| Driver Lack of Premeditation | | | -.013 | .788 |
| Driver Lack of Perseverance | | | .108 | .014 |
| Driver Functional Impulsivity | | | -.078 | .085 |

| | | | | |
|---|---|---|---|---|
| 2nd Step: Impulsive Driver Scale | .247 | .170 | | .000 |
| Driver Functional Impulsivity | | | .076 | .066 |
| Driver Dysfunctional Impulsivity | | | .442 | .000 |

**Table 4.8. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| **DV: DBQ (General) Violations** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .165 | .165 | | .000 |
| Age | | | -.418 | .000 |
| Gender | | | .167 | .000 |
| Total Mileage | | | .000 | 1.000 |
| 2nd Step: BIS-15 Factors | .270 | .105 | | .000 |
| Nonplanning Impulsiveness | | | .066 | .166 |
| Motor Impulsiveness | | | 159 | .003 |
| Attentional Impulsiveness | | | .172 | .002 |
| 2nd Step: UPPS Factors | .293 | .128 | | .000 |
| Urgency | | | .218 | .000 |
| Lack of Premeditation | | | .053 | .311 |
| Lack of Perseverance | | | .160 | .002 |
| Sensation Seeking | | | .149 | .001 |
| 2nd Step: Dickman Scale | .257 | .092 | | .000 |
| Functional Impulsivity | | | -.025 | .541 |
| Dysfunctional Impulsivity | | | .314 | .000 |
| 2nd Step: Impulsive Driver Behavior Scale | .562 | .397 | | .000 |
| Driver Urgency | | | .486 | .000 |
| Driver Lack of Premeditation | | | .213 | .000 |
| Driver Lack of Perseverance | | | .166 | .000 |
| Driver Functional Impulsivity | | | -.017 | .642 |
| 2nd Step: Impulsive Driver Scale | .427 | .262 | | .000 |
| Driver Functional Impulsivity | | | .052 | .148 |
| Driver Dysfunctional Impulsivity | | | .546 | .000 |

**Table 4.9. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| DV: DBQ Errors | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .073 | .073 | | .000 |
| Age | | | -.272 | .000 |
| Gender | | | .139 | .003 |
| Total Mileage | | | .004 | .940 |
| 2nd Step: BIS-15 Factors | .196 | .124 | | .000 |
| Nonplanning Impulsiveness | | | .122 | .016 |
| Motor Impulsiveness | | | .114 | .044 |
| Attentional Impulsiveness | | | .198 | .001 |
| 2nd Step: UPPS Factors | .231 | .158 | | .000 |
| Urgency | | | .311 | .000 |
| Lack of Premeditation | | | .078 | .155 |
| Lack of Perseverance | | | .157 | .004 |
| Sensation Seeking | | | -.044 | .356 |
| 2nd Step: Dickman Scale | .228 | .155 | | .000 |
| Functional Impulsivity | | | -.178 | .000 |
| Dysfunctional Impulsivity | | | .373 | .000 |
| 2nd Step: Impulsive Driver Behavior Scale | .360 | .288 | | .000 |
| Driver Urgency | | | .109 | .012 |
| Driver Lack of Premeditation | | | .131 | .004 |
| Driver Lack of Perseverance | | | .317 | .000 |
| Driver Functional Impulsivity | | | -.244 | .000 |
| 2nd Step: Impulsive Driver Scale | .329 | .256 | | .000 |
| Driver Functional Impulsivity | | | -.171 | .000 |
| Driver Dysfunctional Impulsivity | | | .464 | .000 |

**Table 4.10. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| DV: DBQ Lapses | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | -.221 | .000 |
| Gender | | | .030 | .528 |
| Total Mileage | | | -.025 | .593 |
| 2nd Step: BIS-15 Factors | .226 | .177 | | .000 |
| Nonplanning Impulsiveness | | | .067 | .175 |
| Motor Impulsiveness | | | .181 | .001 |
| Attentional Impulsiveness | | | .261 | .000 |
| 2nd Step: UPPS Factors | .232 | .182 | | .000 |

| | | | | |
|---|---|---|---|---|
| Urgency | | | .387 | .000 |
| Lack of Premeditation | | | .026 | .635 |
| Lack of Perseverance | | | .128 | .019 |
| Sensation Seeking | | | -.019 | .684 |
| 2nd Step: Dickman Scale | .247 | .197 | | .000 |
| Functional Impulsivity | | | -.189 | .000 |
| Dysfunctional Impulsivity | | | .426 | .000 |
| 2nd Step: Impulsive Driver Behavior Scale | .379 | .329 | | .000 |
| Driver Urgency | | | .103 | .016 |
| Driver Lack of Premeditation | | | .171 | .000 |
| Driver Lack of Perseverance | | | .388 | .000 |
| Driver Functional Impulsivity | | | -.162 | .000 |
| 2nd Step: Impulsive Driver Scale | .316 | .266 | | .000 |
| Driver Functional Impulsivity | | | -.122 | .002 |
| Driver Dysfunctional Impulsivity | | | .501 | .000 |

**Table 4.11. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| **DV: DBQ Positive Behaviors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .067 | .067 | | .000 |
| Age | | | .276 | .000 |
| Gender | | | -.049 | .297 |
| Total Mileage | | | -.050 | .283 |
| 2nd Step: BIS-15 Factors | .091 | .024 | | .007 |
| Nonplanning Impulsiveness | | | -.116 | .029 |
| Motor Impulsiveness | | | .025 | .675 |
| Attentional Impulsiveness | | | -.075 | .235 |
| 2nd Step: UPPS Factors | .199 | .132 | | .000 |
| Urgency | | | -.134 | 005 |
| Lack of Premeditation | | | -.218 | .000 |
| Lack of Perseverance | | | -.136 | .015 |
| Sensation Seeking | | | .130 | .008 |
| 2nd Step: Dickman Scale | .134 | .067 | | .000 |
| Functional Impulsivity | | | .150 | .001 |
| Dysfunctional Impulsivity | | | -.228 | .000 |
| 2nd Step: Impulsive Driver Behavior Scale | .251 | .183 | | .000 |
| Driver Urgency | | | -.025 | .593 |
| Driver Lack of Premeditation | | | -.267 | .000 |

| | | | | |
|---|---|---|---|---|
| Driver Lack of Perseverance | | | -.084 | .067 |
| Driver Functional Impulsivity | | | .199 | .000 |
| 2nd Step: Impulsive Driver Scale | .167 | .100 | | .000 |
| Driver Functional Impulsivity | | | 0.202 | .000 |
| Driver Dysfunctional Impulsivity | | | -0.215 | .000 |

### 4.4.6. Impulsive Driver Scale predicting DBQ after controlling for the effects of Dickman Functional/Dysfunctional Scale Factors

A series of hierarchical regression analyses were conducted with one of the DBQ factors as the DV in each analysis, entering age, gender and total mileage in the first step as control variables; functional and dysfunctional impulsivity factors of Dickman Functional/Dysfunctional Impulsivity scale in the second step; and the driver functional and driver dysfunctional impulsivity factors of Impulsive Driver Scale in the third step. The aim of utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Scale explains variance in driver behavior (each DBQ factor) beyond the general functional and dysfunctional impulsivity factors.

The results of these series of analyses showed that, driver functional impulsivity and driver dysfunctional impulsivity factors of the Impulsive Driver Scale, entered in the third step increased the explained variance significantly in each of the DBQ factors, namely ordinary violations ($R^2_{change}$ = .15, $F_{change}$ = 55.98, $p$ < .001); aggressive violations ($R^2_{change}$ = .14, $F_{change}$ = 40.85, $p$ < .001); (general) violations ($R^2_{change}$ = .18, $F_{change}$ = 71.30, $p$ < .001); errors ($R^2_{change}$ = .13, $F_{change}$ = 45.56, $p$ < .001); lapses ($R^2_{change}$ = .12, $F_{change}$ = 43.08, $p$ < .001); and DBQ positive behaviors ($R^2_{change}$ = .05, $F_{change}$ = 13.06, $p$ < .001). This means that driver specific functional and dysfunctional impulsivity factors explained variance in all of the DBQ factors beyond that explained by general functional and dysfunctional impulsivity after controlling for age, gender and total mileage.

Moreover, in the third step of all these analyses, the strength and direction of associations of driver functional and driver dysfunctional impulsivity factors with each DBQ factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by Dickman Functional/Dysfunctional Impulsivity Scale factors, except for the lapses. In the

analysis with lapses factor as the DV, the associations of both driver functional and driver dysfunctional impulsivity were still in the same direction with the previous analysis, but this time functional impulsivity was not significantly associated with lapses. This means that, in all the analyses except for the analysis with lapses, driver specific functional and dysfunctional impulsivity factors were still significantly associated with the DBQ factors that they were found to be significantly related in the previous analyses which were conducted without entering Dickman Functional/Dysfunctional Impulsivity Scale factors in the second step (and therefore, the shared portion of variance between these two IV sets and the DV given to the second step IVs – Dickman Scale factors here). The results are presented in Table 4.12.

**Table 4.12. Hierarchical regression analyses**

| **DV: DBQ Ordinary Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .167 | .167 | | .000 |
| Age | | | -.413 | .000 |
| Gender | | | .200 | .000 |
| Total Mileage | | | -.002 | .959 |
| 2nd Step: Dickman Scale | .263 | .096 | | .000 |
| Functional Impulsivity | | | -.026 | .521 |
| Dysfunctional Impulsivity | | | .321 | .000 |
| 3rd Step: Impulsive Driver Scale | .411 | .148 | | .000 |
| Driver Functional Impulsivity | | | .039 | .330 |
| Driver Dysfunctional Impulsivity | | | .454 | .000 |
| **DV: DBQ Aggressive Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
| 1st Step: Control Variables | 077 | .077 | | .000 |
| Age | | | -.287 | .000 |
| Gender | | | .035 | .458 |
| Total Mileage | | | .006 | .891 |
| 2nd Step: Dickman Scale | .109 | .031 | | .000 |
| Functional Impulsivity | | | -.014 | .758 |
| Dysfunctional Impulsivity | | | .184 | .000 |

| | | | | |
|---|---|---|---|---|
| 3rd Step: Impulsive Driver Scale | .247 | .139 | | .000 |
| Driver Functional Impulsivity | | | .073 | .105 |
| Driver Dysfunctional Impulsivity | | | .438 | .000 |

| **DV: DBQ (General) Violations** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .165 | .165 | | .000 |
| Age | | | -.418 | .000 |
| Gender | | | .167 | .000 |
| Total Mileage | | | .000 | 1.000 |
| 2nd Step: Dickman Scale | .257 | .092 | | .000 |
| Functional Impulsivity | | | -.025 | .541 |
| Dysfunctional Impulsivity | | | .314 | .000 |
| 3rd Step: Impulsive Driver Scale | .438 | .181 | | .000 |
| Driver Functional Impulsivity | | | .055 | .161 |
| Driver Dysfunctional Impulsivity | | | .501 | .000 |

| **DV: DBQ Errors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .073 | .073 | | .000 |
| Age | | | -.272 | .000 |
| Gender | | | .139 | .003 |
| Total Mileage | | | .004 | .940 |
| 2nd Step: Dickman Scale | .228 | .155 | | .000 |
| Functional Impulsivity | | | -.178 | .000 |
| Dysfunctional Impulsivity | | | .373 | .000 |
| 3rd Step: Impulsive Driver Scale | .359 | .131 | | .000 |
| Driver Functional Impulsivity | | | -.130 | .002 |
| Driver Dysfunctional Impulsivity | | | .383 | .000 |

| **DV: DBQ Lapses** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | -.221 | .000 |
| Gender | | | .030 | .528 |
| Total Mileage | | | -.025 | .593 |
| 2nd Step: Dickman Scale | .247 | .197 | | .000 |
| Functional Impulsivity | | | -.189 | .000 |

| | | | | |
|---|---|---|---|---|
| Dysfunctional Impulsivity | | | .426 | .000 |
| 3rd Step: Impulsive Driver Scale | .369 | .122 | | .000 |
| Driver Functional Impulsivity | | | -.067 | .107 |
| Driver Dysfunctional Impulsivity | | | .394 | .000 |

| **DV: DBQ Positive Behaviors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .067 | .067 | | .000 |
| Age | | | .276 | .000 |
| Gender | | | -.049 | .297 |
| Total Mileage | | | -.050 | .283 |
| 2nd Step: Dickman Scale | .134 | .067 | | .000 |
| Functional Impulsivity | | | .150 | .001 |
| Dysfunctional Impulsivity | | | -.228 | .000 |
| 3rd Step: Impulsive Driver Scale | .183 | .048 | | .000 |
| Driver Functional Impulsivity | | | .169 | .000 |
| Driver Dysfunctional Impulsivity | | | -.158 | .002 |

### 4.4.7. Impulsive Driver Scale predicting DBQ after controlling for the effects of BIS-15 Factors

A series of hierarchical regression analyses were conducted with one of the DBQ factors as the DV in each analysis, with age, gender and total mileage entered in the first step as control variables; nonplanning, motor and attentional impulsivity factors of BIS-15 entered in the second step; and the driver functional and driver dysfunctional impulsivity factors of Impulsive Driver Scale entered in the third step. The aim of utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Scale explains variance in driver behavior (each DBQ factor) beyond a general impulsive personality scale.

The results of these series of analyses showed that, driver functional impulsivity and driver dysfunctional impulsivity factors of the Impulsive Driver Scale, entered in the third step increased the explained variance significantly in each of the DBQ factors, namely ordinary violations ($R^2_{change}$ = .13, $F_{change}$ = 51.77, $p$ < .001); aggressive violations ($R^2_{change}$ = .14, $F_{change}$ = 43.36, $p$ < .001); (general)

violations ($R^2_{change}$ = .17, $F_{change}$ = 68.71, $p$ < .001); errors ($R^2_{change}$ = .15, $F_{change}$ = 51.51, $p$ < .001); lapses ($R^2_{change}$ = .13, $F_{change}$ = 46.31, $p$ < .001); and DBQ positive behaviors ($R^2_{change}$ = .08, $F_{change}$ = 21.65, $p$ < .001). This means that driver specific functional and dysfunctional impulsivity factors explained variance in all of the DBQ factors beyond that explained by general impulsivity (measured by BIS-15) after controlling for age, gender and total mileage.

Furthermore, in the third step of all these analyses, the strength and direction of associations of driver functional and driver dysfunctional impulsivity factors with each DBQ factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by BIS-15 factors. This means that, driver specific functional and dysfunctional impulsivity factors were still significantly associated with the DBQ factors that they were found to be significantly related in the previous analyses which were conducted without entering BIS-15 factors in the second step (and therefore the shared portion of variance between these two IV sets and the DV given to the second step IVs – BIS-15 factors here). The results are presented in Table 4.13.

**Table 4.13. Hierarchical regression analyses**

| **DV: DBQ Ordinary Violations** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .167 | .167 | | .000 |
| Age | | | -.413 | .000 |
| Gender | | | .200 | .000 |
| Total Mileage | | | -.002 | .959 |
| 2nd Step: BIS Factors | .284 | .117 | | .000 |
| Nonplanning Impulsiveness | | | .098 | .040 |
| Motor Impulsiveness | | | .141 | .008 |
| Attentional Impulsiveness | | | .184 | .001 |
| 3rd Step: Impulsive Driver Scale | .415 | .132 | | .000 |
| Driver Functional Impulsivity | | | .053 | .161 |
| Driver Dysfunctional Impulsivity | | | .436 | .000 |
| **DV: DBQ Aggressive** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |

| **Violations** | | | | |
|---|---|---|---|---|
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | -.287 | .000 |
| Gender | | | .035 | .458 |
| Total Mileage | | | .006 | .891 |
| 2nd Step: BIS Factors | .111 | .034 | | .001 |
| Nonplanning Impulsiveness | | | -.026 | .625 |
| Motor Impulsiveness | | | .149 | .012 |
| Attentional Impulsiveness | | | .077 | .219 |
| 3rd Step: Impulsive Driver Scale | .252 | .142 | | .000 |
| Driver Functional Impulsivity | | | .060 | .163 |
| Driver Dysfunctional Impulsivity | | | .453 | .000 |

| **DV: DBQ (General) Violations** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .165 | 0.165 | | .000 |
| Age | | | -.418 | .000 |
| Gender | | | .167 | .000 |
| Total Mileage | | | .000 | 1.000 |
| 2nd Step: BIS Factors | .270 | .105 | | .000 |
| Nonplanning Impulsiveness | | | .066 | .166 |
| Motor Impulsiveness | | | .159 | .003 |
| Attentional Impulsiveness | | | .172 | .002 |
| 3rd Step: Impulsive Driver Scale | .438 | .168 | | .000 |
| Driver Functional Impulsivity | | | .061 | .100 |
| Driver Dysfunctional Impulsivity | | | .493 | .000 |

| **DV: DBQ errors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .073 | .073 | | .000 |
| Age | | | -.272 | .000 |
| Gender | | | .139 | .003 |
| Total Mileage | | | .004 | .940 |
| 2nd Step: BIS Factors | .196 | .124 | | .000 |
| Nonplanning Impulsiveness | | | .122 | .016 |
| Motor Impulsiveness | | | .114 | .044 |
| Attentional Impulsiveness | | | .198 | .001 |
| 3rd Step: Impulsive Driver Scale | .344 | .148 | | .000 |
| Driver Functional | | | -.157 | .000 |

| | | | | |
|---|---|---|---|---|
| Impulsivity | | | | |
| Driver Dysfunctional Impulsivity | | | .398 | .000 |
| | | | | |
| **DV: DBQ Lapses** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | -.221 | .000 |
| Gender | | | .030 | .528 |
| Total Mileage | | | -.025 | .593 |
| 2nd Step: BIS Factors | .226 | .177 | | .000 |
| Nonplanning Impulsiveness | | | .067 | .175 |
| Motor Impulsiveness | | | .181 | .001 |
| Attentional Impulsiveness | | | .261 | .000 |
| 3rd Step: Impulsive Driver Scale | .356 | .130 | | .000 |
| Driver Functional Impulsivity | | | -.109 | .006 |
| Driver Dysfunctional Impulsivity | | | .395 | .000 |
| | | | | |
| **DV: DBQ Positive Behaviors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
| 1st Step: Control Variables | .067 | .067 | | .000 |
| Age | | | .276 | .000 |
| Gender | | | -.049 | .297 |
| Total Mileage | | | -.050 | .283 |
| 2nd Step: BIS Factors | .091 | .024 | | .007 |
| Nonplanning Impulsiveness | | | -.116 | .029 |
| Motor Impulsiveness | | | .025 | .675 |
| Attentional Impulsiveness | | | -.075 | .235 |
| 3rd Step: Impulsive Driver Scale | .169 | .078 | | .000 |
| Driver Functional Impulsivity | | | .194 | .000 |
| Driver Dysfunctional Impulsivity | | | -.221 | .000 |

### 4.4.8. Impulsive Driver Behavior Scale predicting DBQ after controlling for the effects of Dickman Functional/Dysfunctional Scale Factors

A series of hierarchical regression analyses were conducted with one of the DBQ factors as the DV in each analysis, with age, gender and total mileage entered in the first step as control variables; Dickman`s functional impulsivity dysfunctional impulsivity entered in the second step; and the driver urgency, driver lack of

premeditation, driver lack of perseverance and driver functional impulsivity factors of Impulsive Driver Behavior Scale entered in the third step. The aim of utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Scale explains variance in driver behavior (each DBQ factor) beyond the general functional and dysfunctional impulsivity factors.

The results of these series of analyses showed that, the four factors of the Impulsive Driver Behavior Scale, entered in the third step increased the explained variance significantly in each of the DBQ factors, namely ordinary violations ($R^2_{change}$ = .28, $F_{change}$ = 68.31, $p$ < .001); aggressive violations ($R^2_{change}$ = .22, $F_{change}$ = 34.06, $p$ < .001); (general) violations ($R^2_{change}$ = .31, $F_{change}$ = 78.32, $p$ < .001); errors ($R^2_{change}$ = .16, $F_{change}$ = 28.00, $p$ < .001); lapses ($R^2_{change}$ = .17, $F_{change}$ = 31.81, $p$ < .001); and DBQ positive behaviors ($R^2_{change}$ = .12, $F_{change}$ = 18.52, $p$ < .001). This means that the four factors of the Impulsive Driver Behavior Scale explained variance in all of the DBQ factors beyond that explained by general functional and dysfunctional impulsivity (measured by Dickman Functional/Dysfunctional Impulsivity Scale) after controlling for age, gender and total mileage.

In the third step of all these analyses, the strength and direction of associations of Driver Impulsive Behavior Scale factors with each DBQ factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by Dickman Functional/Dysfunctional Impulsivity Scale, except for the association of only driver urgency with errors and lapses. However, these two associations were already the weakest ones in the previous analysis, and when general functional and dysfunctional impulsivity factors were entered in the second step taking the shared portion of explained variance, it is reasonable that these two associations lost their significance. All in all, this pattern of the results means that, Driver Impulsive Behavior Scale factors were still significantly associated with the DBQ factors that they were found to be significantly related in the previous analyses which were conducted without entering Dickman`s functional and dysfunctional impulsivity factors in the second step (and therefore the shared portion of variance between these two IV sets and the DV given to the second step IVs – Dickman Functional/Dysfunctional Impulsivity Scale factors here). The results are presented in Table 4.14.

**Table 4.14. Hierarchical regression analyses**

| **DV: DBQ Ordinary Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .167 | .167 | | .000 |
| Age | | | -.413 | .000 |
| Gender | | | .200 | .000 |
| Total Mileage | | | -.002 | .959 |
| 2nd Step: Dickman Scale | .263 | .096 | | .000 |
| Functional Impulsivity | | | -.026 | .521 |
| Dysfunctional Impulsivity | | | .321 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .544 | .282 | | .000 |
| Driver Urgency | | | .407 | .000 |
| Driver Lack of Premeditation | | | .267 | .000 |
| Driver Lack of Perseverance | | | .150 | .000 |
| Driver Functional Impulsivity | | | .016 | .698 |

| **DV: DBQ Aggressive Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | -.287 | .000 |
| Gender | | | .035 | .458 |
| Total Mileage | | | .006 | .891 |
| 2nd Step: Dickman Scale | .109 | .031 | | .000 |
| Functional Impulsivity | | | -.014 | .758 |
| Dysfunctional Impulsivity | | | .184 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .323 | .215 | | .000 |
| Driver Urgency | | | .476 | .000 |
| Driver Lack of Premeditation | | | -.017 | .730 |
| Driver Lack of Perseverance | | | .107 | .022 |
| Driver Functional Impulsivity | | | -.084 | .086 |

| **DV: DBQ (General) Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .165 | .165 | | .000 |
| Age | | | -.418 | .000 |
| Gender | | | .167 | .000 |
| Total Mileage | | | .000 | 1.000 |
| 2nd Step: Dickman Scale | .257 | .092 | | .000 |
| Functional Impulsivity | | | -.025 | .541 |
| Dysfunctional Impulsivity | | | .314 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .565 | .308 | | .000 |
| Driver Urgency | | | .477 | .000 |
| Driver Lack of Premeditation | | | .201 | .000 |

| | | | | |
|---|---|---|---|---|
| Driver Lack of Perseverance | | | .151 | 000 |
| Driver Functional Impulsivity | | | -.017 | .668 |
| | | | | |
| **DV: DBQ Errors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
| 1st Step: Control Variables | .073 | .073 | | .000 |
| Age | | | -.272 | .000 |
| Gender | | | .139 | .003 |
| Total Mileage | | | .004 | .940 |
| 2nd Step: Dickman Scale | .228 | .155 | | .000 |
| Functional Impulsivity | | | -.178 | .000 |
| Dysfunctional Impulsivity | | | .373 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .384 | .156 | | .000 |
| Driver Urgency | | | .085 | .053 |
| Driver Lack of Premeditation | | | .108 | .022 |
| Driver Lack of Perseverance | | | .266 | .000 |
| Driver Functional Impulsivity | | | -.214 | .000 |
| | | | | |
| **DV: DBQ Lapses** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | -.221 | .000 |
| Gender | | | .030 | .528 |
| Total Mileage | | | -.025 | .593 |
| 2nd Step: Dickman Scale | .247 | .197 | | .000 |
| Functional Impulsivity | | | -.189 | .000 |
| Dysfunctional Impulsivity | | | .426 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .415 | .168 | | .000 |
| Driver Urgency | | | .075 | .081 |
| Driver Lack of Premeditation | | | .146 | .001 |
| Driver Lack of Perseverance | | | .324 | .000 |
| Driver Functional Impulsivity | | | -.119 | .009 |
| | | | | |
| **DV: DBQ Positive Behaviors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
| 1st Step: Control Variables | .067 | .067 | | .000 |
| Age | | | .276 | .000 |
| Gender | | | -.049 | .297 |
| Total Mileage | | | -.050 | .283 |
| 2nd Step: Dickman Scale | .134 | .067 | | .000 |
| Functional Impulsivity | | | .150 | .001 |
| Dysfunctional Impulsivity | | | -.228 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .259 | .124 | | .000 |
| Driver Urgency | | | -.014 | .772 |

| | | |
|---|---|---|
| Driver Lack of Premeditation | -.261 | .000 |
| Driver Lack of Perseverance | -.055 | .258 |
| Driver Functional Impulsivity | .171 | .001 |

### 4.4.9. Impulsive Driver Behavior Scale predicting DBQ after controlling for the effects of UPPS Impulsive Behavior Scale Factors

A series of hierarchical regression analyses were conducted with one of the DBQ factors as the DV in each analysis, with age, gender and total mileage entered in the first step as control variables; urgency, lack of premeditation, lack or perseverance and sensation seeking factors of UPPS Impulsive Behavior Scale entered in the second step; and the driver urgency, driver lack of premeditation, driver lack of perseverance and driver functional impulsivity factors of Impulsive Driver Behavior Scale entered in the third step. The aim of utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Behavior Scale explains variance in driver behavior (each DBQ factor) beyond a general impulsive behavior scale.

The results of these series of analyses showed that, the four factors of the Impulsive Driver Behavior Scale, entered in the third step increased the explained variance significantly in each of the DBQ factors, namely ordinary violations ($R^2_{change}$ = .25, $F_{change}$ = 59.59, $p$ < .001); aggressive violations ($R^2_{change}$ = .20, $F_{change}$ = 31.67, $p$ < .001); (general) violations ($R^2_{change}$ = .28, $F_{change}$ = 68.74, $p$ < .001); errors ($R^2_{change}$ = .15, $F_{change}$ = 26.44, $p$ < .001); lapses ($R^2_{change}$ = .18, $F_{change}$ = 33.00, $p$ < .001); and DBQ positive behaviors ($R^2_{change}$ = .09, $F_{change}$ = 13.43, $p$ < .001). This means that the four factors of the Impulsive Driver Behavior Scale explained variance in all of the DBQ factors beyond that explained by general impulsive behavior (measured by UPPS Impulvive Behavior Scale) after controlling for age, gender and total mileage.

In the third step of all these analyses, the strength and direction of associations of Driver Impulsive Behavior Scale factors with each DBQ factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by UPPS factors, except for the association of only driver urgency with errors and lapses. However, these two associations were

already the weakest ones in the previous analysis, and when four "general" impulsivity factors were entered in the second step taking the shared portion of explained variance, it is reasonable that these two associations lost their significance. All in all, this pattern of the results means that, Driver Impulsive Behavior Scale factors were still significantly associated with the DBQ factors that they were found to be significantly related in the previous analyses which were conducted without entering UPPS factors in the second step (and therefore the shared portion of variance between these two IV sets and the DV given to the second step IVs – UPPS Impulsive Behavior Scale factors here). The results are presented in Table 4.15.

**Table 4.15. Hierarchical regression analyses**

| **DV: DBQ Ordinary Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .167 | .167 | | .000 |
| Age | | | -.413 | .000 |
| Gender | | | .200 | .000 |
| Total Mileage | | | -.002 | .959 |
| 2nd Step: UPPS Factors | .306 | .139 | | .000 |
| Urgency | | | .200 | .000 |
| Lack of Premeditation | | | .064 | .215 |
| Lack of Perseverance | | | .183 | .000 |
| Sensation Seeking | | | .171 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .556 | .250 | | .000 |
| Driver Urgency | | | .394 | .000 |
| Driver Lack of Premeditation | | | .260 | .000 |
| Driver Lack of Perseverance | | | .133 | .001 |
| Driver Functional Impulsivity | | | .013 | .744 |
| | | | | |
| **DV: DBQ Aggressive Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | -.287 | .000 |
| Gender | | | .035 | .458 |
| Total Mileage | | | .006 | 891 |
| 2nd Step: UPPS Factors | .123 | .045 | | .000 |
| Urgency | | | .188 | .000 |
| Lack of Premeditation | | | .015 | .793 |
| Lack of Perseverance | | | .044 | .454 |
| Sensation Seeking | | | .042 | .403 |
| 3rd Step: Impulsive Driver | .325 | .202 | | .000 |

| | | | | |
|---|---|---|---|---|
| Behavior Scale | | | | |
| Driver Urgency | | | .473 | .000 |
| Driver Lack of Premeditation | | | -.012 | .814 |
| Driver Lack of Perseverance | | | .102 | .034 |
| Driver Functional Impulsivity | | | -.071 | .157 |
| | | | | |
| **DV: DBQ (General) Violations** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
| 1st Step: Control Variables | .165 | .165 | | .000 |
| Age | | | -.418 | .000 |
| Gender | | | .167 | .000 |
| Total Mileage | | | .000 | 1.000 |
| 2nd Step: UPPS Factors | .293 | .128 | | .000 |
| Urgency | | | .218 | .000 |
| Lack of Premeditation | | | .053 | .311 |
| Lack of Perseverance | | | .160 | .002 |
| Sensation Seeking | | | .149 | 001 |
| 3rd Step: Impulsive Driver Behavior Scale | .572 | .278 | | .000 |
| Driver Urgency | | | .466 | .000 |
| Driver Lack of Premeditation | | | .198 | .000 |
| Driver Lack of Perseverance | | | .136 | .000 |
| Driver Functional Impulsivity | | | -.015 | .717 |
| | | | | |
| **DV: DBQ Errors** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
| 1st Step: Control Variables | .073 | .073 | | .000 |
| Age | | | -.272 | .000 |
| Gender | | | .139 | .003 |
| Total Mileage | | | .004 | .940 |
| 2nd Step: UPPS Factors | .231 | .158 | | .000 |
| Urgency | | | .311 | .000 |
| Lack of Premeditation | | | .078 | .155 |
| Lack of Perseverance | | | .157 | .004 |
| Sensation Seeking | | | -.044 | .356 |
| 3rd Step: Impulsive Driver Behavior Scale | .385 | .154 | | .000 |
| Driver Urgency | | | .077 | 088 |
| Driver Lack of Premeditation | | | .115 | .017 |
| Driver Lack of Perseverance | | | .272 | .000 |
| Driver Functional Impulsivity | | | -.202 | .000 |
| | | | | |
| **DV: DBQ Lapses** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | -.221 | .000 |
| Gender | | | .030 | .528 |

| | | | | |
|---|---|---|---|---|
| Total Mileage | | | -.025 | .593 |
| 2nd Step: UPPS Factors | .232 | .182 | | .000 |
| Urgency | | | .387 | .000 |
| Lack of Premeditation | | | .026 | .635 |
| Lack of Perseverance | | | .128 | .019 |
| Sensation Seeking | | | -.019 | .684 |
| 3rd Step: Impulsive Driver Behavior Scale | .414 | .183 | | .000 |
| Driver Urgency | | | .065 | .140 |
| Driver Lack of Premeditation | | | .170 | .000 |
| Driver Lack of Perseverance | | | .333 | .000 |
| Driver Functional Impulsivity | | | -.123 | .009 |

| **DV: DBQ Positive Behaviors** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .067 | .067 | | .000 |
| Age | | | .276 | .000 |
| Gender | | | -.049 | .297 |
| Total Mileage | | | -.050 | .283 |
| 2nd Step: UPPS Factors | .199 | .132 | | .000 |
| Urgency | | | -.134 | .005 |
| Lack of Premeditation | | | -.218 | .000 |
| Lack of Perseverance | | | -.136 | .015 |
| Sensation Seeking | | | .130 | .008 |
| 3rd Step: Impulsive Driver Behavior Scale | .289 | .090 | | .000 |
| Driver Urgency | | | -.010 | .833 |
| Driver Lack of Premeditation | | | -.229 | .000 |
| Driver Lack of Perseverance | | | -.068 | .166 |
| Driver Functional Impulsivity | | | .135 | .009 |

### 4.4.10. BIS-15 predicting DSI

Two hierarchical regression analyses were conducted with BIS-15 factors, namely nonplanning, motor and attentional impulsivity as the predictors; and with one of the DSI factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 8.10, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .05, $F_{change}$ = 8.10, $p$ < .001) explained a significant amount of variance in perceptual-motor skills factor of DSI beyond that explained by the first step. Nonplanning impulsivity ($\beta$= -.14, $p$ < .01) and attentional impulsivity ($\beta$= -.14, $p$ <

.05) factors were found to be significantly negatively associated with perceptual-motor skills, whereas motor impulsivity ($\beta$= .13, $p$ < .05) was significantly positively related to perceptual-motor skills.

In the second analysis, the DV was safety skills factor of DSI. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.77, $p$ < .001), the three BIS-15 factors entered in the second step ($R^2_{change}$ = .10, $F_{change}$ = 17.97, $p$ < .001) explained a significant amount of variance in safety skills factor of DSI beyond that explained by the first step. Among the three factors of BIS-15, only nonplanning impulsivity ($\beta$= -.25, $p$ < .001) was found to be significantly negatively related to safety skills, which is reasonable since nonplanning impulsivity reflects a lack of future orientation which is in contrast with the concept of safety in general.

### 4.4.11. UPPS Impulsive Behavior Scale predicting DSI

Two hierarchical regression analyses were conducted with UPPS Impulsive Behavior Scale factors, namely urgency, lack of premeditation, lack of perseverance and sensation seeking as the predictors; and with one of the DSI factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 7.62, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ = .16, $F_{change}$ = 21.52, $p$ < .001) explained a significant amount of variance in perceptual-motor skills factor of DSI beyond that explained by the first step. Urgency ($\beta$= -.14, $p$ < .005) and lack of perseverance ($\beta$= -.21, $p$ < .001) were significantly negatively; and sensation seeking ($\beta$= .28, $p$ < .001) was positively associated with perceptual-motor skills, while lack of premeditation was not significantly related to perceptual-motor skills.

In the second analysis, the DV was safety skills factor of DSI. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.02, $p$ < .001), the four UPPS factors entered in the second step ($R^2_{change}$ = .16, $F_{change}$ = 22.73, $p$ < .001) explained a significant amount of variance safety skills factor of DSI beyond that explained by the first step. Urgency ($\beta$= -.18, $p$ < .001), lack of premeditation ($\beta$= -.24, $p$ < .001), lack of perseverance ($\beta$= -.14, $p$ < .05) were

significantly negatively related to safety skills, whereas sensation seeking was not significantly related to safety skills.

### 4.4.12. Dickman Functional/Dysfunctional Impulsivity Scale predicting DSI

Two hierarchical regression analyses were conducted with Dickman Funcitonal/Dysfunctional Impulsivity Scale factors as the predictors, and with one of the DSI factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 7.92, $p$ < .001), Dickman functional and dysfunctional impulsivity factors entered in the second step ($R^2_{change}$ = .16, $F_{change}$ = 46.15, $p$ < .001) explained a significant amount of variance in perceptual-motor skills factor of DSI beyond that explained by the first step. Functional impulsivity ($\beta$= .37, $p$ < .001) was positively and dysfunctional impulsivity ($\beta$= -.19, $p$ < .001) was negatively associated perceptual-motor skills.

In the second analysis, the DV was safety skills factor of DSI. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.49, $p$ < .001), Dickman functional and dysfunctional impulsivity factors entered in the second step ($R^2_{change}$ = .08, $F_{change}$ = 20.26, $p$ < .001) explained a significant amount of variance in safety skills factor of DSI beyond that explained by the first step. Functional impulsivity ($\beta$= .11, $p$ < .05) was positively and dysfunctional impulsivity ($\beta$= -.27, $p$ < .001) was negatively associated with safety skills.

The pattern of these results are in line with the expectations that functional impulsivity would have a stronger association with perceptual-motor skills in driving than it has with safety skills. In addition, it was also expected that the link between functional impulsivity and perceptual-motor skills would be stronger than that between dysfunctional impulsivity and perceptual-motor skills. Moreover, it was expected that dysfunctional impulsivity would be more strongly associated with safety skills than perceptual-motor skills. Also, the relationship between dysfunctional impulsivity and safety skills would be stronger than the relationship between functional impulsivity and safety skills. The findings meet all of these expectations.

### 4.4.13. Impulsive Driver Behavior Scale predicting DSI

Two hierarchical regression analyses were conducted with Impulsive Driver Behavior Scale factors, namely driver urgency, driver lack of premeditation, driver lack of perseverance and driver functional impulsivity as the predictors; and with one of the DSI factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After age, gender and total mileage variables were controlled in the first step ($R^2$ = .05, $F_{change}$ = 8.10, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .41, $F_{change}$ = 87.13, $p$ < .001) explained a significant amount of variance in perceptual-motor skills factor of DSI beyond that explained by the first step. Driver urgency ($\beta$= .10, $p$ < .05) and driver functional impulsivity ($\beta$= .64, $p$ < .001) were significantly positively associated with perceptual-motor skills; while driver lack of perseverance and driver lack of premeditation was not significantly associated with perceptual-motor skills.

In the second analysis, the DV was safety skills factor of DSI. After age, gender and total mileage were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.77, $p$ < .001), the four Impulsive Driver Behavior Scale factors entered in the second step ($R^2_{change}$ = .38, $F_{change}$ = 77.55, $p$ < .001) explained a significant amount of variance in safety skills factor of DSI beyond that explained by the first step. Driver urgency ($\beta$= -.41, $p$ < .001) and driver lack of premeditation ($\beta$= -.26, $p$ < .001) were negatively, driver functional impulsivity ($\beta$= .23, $p$ < .001) was positively associated with safety skills; while driver lack of perseverance was not significantly associated with safety skills.

In general, results of these analyses revealed an expected pattern. That is, the strongest predictor of perceptual-motor skills among the four factors of Impulsive Driver Behavior Scale was driver functional impulsivity as expected. In addition, driver urgency and driver lack of premeditation were more strongly associated with safety skills than driver functional impulsivity. In addition, these two driver specific "dysfunctional" impulsivity factors were more strongly associated with safety skills than they are with perceptual-motor skills as expected.

### 4.4.14. Impulsive Driver Scale predicting DSI

Two hierarchical regression analyses were conducted with driver functional and driver dysfunctional impulsivity factors of the Impulsive Driver Scale as the predictors, and with one of the DSI factors as the DV in each analysis. In all these analyses, age, gender and total mileage were controlled in the first step.

After , age, gender and total mileage were controlled in the first step ($R^2$ = .05, $F_{change}$ = 8.10, $p$ < .001), the two Impulsive Driver Scale factors entered in the second step ($R^2_{change}$ = .34, $F_{change}$ = 128.17, $p$ < .001) explained a significant amount of variance in perceptual-motor skills factor of DSI beyond that explained by the first step. Driver functional impulsivity ($\beta$= .56, $p$ < .001) was positively and driver dysfunctional impulsivity ($\beta$= -.10, $p$ < .05) was negatively associated with perceptual-motor skills.

In the second analysis, the DV was safety skills factor of DSI. After the demographic and mileage related variables were controlled in the first step ($R^2$ = .08, $F_{change}$ = 12.77, $p$ < .001), the two Impulsive Driver Scale factors entered in the second step ($R^2_{change}$ = .27, $F_{change}$ = 93.38, $p$ < .001) explained a significant amount of variance in safety skills factor of DSI beyond that explained by the first step. Driver functional impulsivity ($\beta$= .21, $p$ < .001) was positively and driver dysfunctional impulsivity ($\beta$= -.45, $p$ < .001) was negatively associated with safety skills.

The pattern of results of these analyses are parallel with the results of the analyses with Dickman Functional/Dysfunctional Impulsivity Scale factors as the predictors, therefore these findings also in line with the expectations in terms of differential effects of functional and dysfunctional impulsivity on perceptual-motor versus safety skills (a more detailed explanation of the expected strength and direction of associations are presented above).

**Table 4.16. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| **DV: DSI Perceptual-motor** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **Skills** | | | | |
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | .040 | .446 |
| Gender | | | .143 | .003 |
| Total Mileage | | | .133 | .005 |
| 2nd Step: BIS-15 Factors | .099 | .048 | | .000 |
| Nonplanning Impulsiveness | | | -.142 | .008 |
| Motor Impulsiveness | | | .132 | .028 |
| Attentional Impulsiveness | | | -.171 | .007 |
| 2nd Step: UPPS Factors | .210 | .159 | | .000 |
| Urgency | | | -.141 | .003 |
| Lack of Premeditation | | | -.095 | .087 |
| Lack of Perseverance | | | -.211 | .000 |
| Sensation Seeking | | | .283 | .000 |
| 2nd Step: Dickman Scale | .213 | .163 | | .000 |
| Functional Impulsivity | | | .372 | .000 |
| Dysfunctional Impulsivity | | | -.185 | .000 |
| 2nd Step: Impulsive Driver Behavior Scale | .463 | .412 | | .000 |
| Driver Urgency | | | .098 | .015 |
| Driver Lack of Premeditation | | | .020 | .637 |
| Driver Lack of Perseverance | | | -.076 | .053 |
| Driver Functional Impulsivity | | | .638 | .000 |
| 2nd Step: Impulsive Driver Scale | .392 | .342 | | .000 |
| Driver Functional Impulsivity | | | .560 | .000 |
| Driver Dysfunctional Impulsivity | | | -.098 | .013 |

**Table 4.17. Summary of separate regression analyses with the general and driving specific impulsivity measures after controlling for age, gender and mileage**

| **DV: DSI Safety** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .077 | .077 | | |
| Age | | | .241 | .000 |
| Gender | | | -.088 | .000 |
| Total Mileage | | | .106 | .059 |
| 2nd Step: BIS-15 Factors | .175 | .098 | | .024 |
| Nonplanning Impulsiveness | | | -.252 | .000 |
| Motor Impulsiveness | | | .000 | .000 |
| Attentional Impulsiveness | | | -.100 | .994 |
| 2nd Step: UPPS Factors | .239 | .162 | | .101 |

| | | | | |
|---|---|---|---|---|
| Urgency | | | -.183 | .000 |
| Lack of Premeditation | | | -.238 | .000 |
| Lack of Perseverance | | | -.140 | .000 |
| Sensation Seeking | | | .035 | .010 |
| 2nd Step: Dickman Scale | .154 | .077 | | .455 |
| Functional Impulsivity | | | .107 | .000 |
| Dysfunctional Impulsivity | | | -.270 | .015 |
| 2nd Step: Impulsive Driver Behavior Scale | .452 | .375 | | .000 |
| Driver Urgency | | | -.407 | .000 |
| Driver Lack of Premeditation | | | -.257 | .000 |
| Driver Lack of Perseverance | | | -.068 | .000 |
| Driver Functional Impulsivity | | | .227 | .087 |
| 2nd Step: Impulsive Driver Scale | .345 | .268 | | .000 |
| Driver Functional Impulsivity | | | .213 | .000 |
| Driver Dysfunctional Impulsivity | | | -.451 | .000 |

### 4.4.15. Impulsive Driver Scale predicting DSI after controlling for the effects of BIS-15 Factors

Two hierarchical regression analyses were conducted with one of the DSI factors as the DV in each analysis; with age, gender and total mileage entered in the first step as control variables; nonplanning, motor and attentional impulsivity factors of BIS-15 entered in the second step; and the driver functional and driver dysfunctional impulsivity factors of Impulsive Driver Scale entered in the third step. The aim of utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Scale explains variance in driver skills (DSI perceptual-motor and safety skills) beyond a general impulsive personality scale.

The results of these series of analyses showed that, driver functional impulsivity and driver dysfunctional impulsivity factors of the Impulsive Driver Scale, entered in the third step increased the explained variance significantly in both of the DSI factors, namely perceptual-motor skills ($R^2_{change}$ = .30, $F_{change}$ =111.46, $p$ < .001) and safety skills ($R^2_{change}$ = .19, $F_{change}$ = 67.30, $p$ < .001). This means that driver specific functional and dysfunctional impulsivity factors explained variance in

both factors of the DSI beyond that explained by general impulsivity after controlling for age, gender and total mileage.

Furthermore, in the third step in both analyses, the strength and direction of associations of driver functional and driver dysfunctional impulsivity factors with each DSI factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by BIS-15 factors, again This means that, driver specific functional and dysfunctional impulsivity factors were still significantly associated with the DSI factors that they were found to be significantly related in the previous analyses which were conducted without entering BIS-15 factors in the second step (and therefore the shared portion of variance between these two IV sets and the DV given to the second step IVs – BIS-15 factors here).

**Table 4.18. Hierarchical Regression Analyses**

| **DV: DSI Perceptual-motor Skills** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | .037 | .446 |
| Gender | | | .143 | .003 |
| Total Mileage | | | .133 | .005 |
| 2nd Step: BIS Factors | .099 | .048 | | .000 |
| Nonplanning Impulsiveness | | | -.142 | .008 |
| Motor Impulsiveness | | | .132 | .028 |
| Attentional Impulsiveness | | | -.171 | .007 |
| 3rd Step: Impulsive Driver Scale | .396 | .297 | | .000 |
| Driver Functional Impulsivity | | | .551 | .000 |
| Driver Dysfunctional Impulsivity | | | -.102 | .021 |
| **DV: DSI Safety** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | .241 | .000 |
| Gender | | | -.088 | .059 |
| Total Mileage | | | .106 | .024 |
| 2nd Step: BIS Factors | .175 | .098 | | .000 |

| | | | | |
|---|---|---|---|---|
| Nonplanning Impulsiveness | | | -.252 | .000 |
| Motor Impulsiveness | | | .000 | .994 |
| Attentional Impulsiveness | | | -.100 | .101 |
| 3rd Step: Impulsive Driver Scale | .364 | .189 | | .000 |
| Driver Functional Impulsivity | | | .189 | .000 |
| Driver Dysfunctional Impulsivity | | | -.443 | .000 |

### 4.4.16. Impulsive Driver Scale predicting DSI after controlling for the effects of Dickman Functional/Dysfunctional Scale Factors

Two hierarchical regression analyses were conducted with each DSI factor as the DV in each analysis, entering age, gender and total mileage in the first step as control variables; functional and dysfunctional impulsivity factors of Dickman Functional/Dysfunctional Impulsivity scale in the second step; and the driver functional and driver dysfunctional impulsivity factors of Impulsive Driver Scale in the third step. The aim of utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Scale explains variance in driver skills (DSI perceptual-motor and safety skills) beyond the general functional and dysfunctional impulsivity factors.

The results of these analyses showed that, driver functional impulsivity and driver dysfunctional impulsivity factors of the Impulsive Driver Scale, entered in the third step increased the explained variance significantly in both of the DSI factors, namely ordinary perceptual-motor skills ($R^2_{change}$ = .21, $F_{change}$ = 82.93, $p$ < .001); and safety skills ($R^2_{change}$ = .19, $F_{change}$ = 65.98, $p$ < .001). This means that driver specific functional and dysfunctional impulsivity factors explained variance in both factors of the DSI beyond that explained by general functional and dysfunctional impulsivity after controlling for age, gender and total mileage.

Moreover, in the third step of all these analyses, the strength and direction of associations of driver functional and driver dysfunctional impulsivity factors with each DSI factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by Dickman Functional/Dysfunctional Impulsivity Scale factors, except for the association

between driver dysfunctional impulsivity and perceptual-motor skills. This relationship between dysfunctional impulsivity and perceptual-motor skills was already the weakest one ($\beta$= -.10, $p$ < .05) in the previous analysis, and when general functional and dysfunctional impulsivity factors were entered in the second step taking the shared portion of explained variance, it is reasonable that it could not reach significance. In addition, still the pattern of the differential relationships of driver functional and driver dysfunctional impulsivity with DSI factors were in line with the expectations (detailed explanation of these expectations were presented above) both in terms of strength and direction.

**Table 4.19. Hierarchical Regression Analyses**

| **DV: DSI Perceptual-motor Skills** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | .037 | .446 |
| Gender | | | .143 | .003 |
| Total Mileage | | | .133 | .005 |
| 2nd Step: Dickman Scale | .213 | .163 | | .000 |
| Functional Impulsivity | | | .372 | .000 |
| Dysfunctional Impulsivity | | | -.185 | .000 |
| 3rd Step: Impulsive Driver Scale | .427 | .214 | | .000 |
| Driver Functional Impulsivity | | | .491 | .000 |
| Driver Dysfunctional Impulsivity | | | -.061 | .153 |
| **DV: DSI Safety** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | .241 | .000 |
| Gender | | | -.088 | .059 |
| Total Mileage | | | .106 | .024 |
| 2nd Step: Dickman Scale | .154 | .077 | | .000 |
| Functional Impulsivity | | | .107 | .015 |
| Dysfunctional Impulsivity | | | -.270 | .000 |
| 3rd Step: Impulsive Driver Scale | .348 | 0.194 | | .000 |
| Driver Functional Impulsivity | | | .216 | .000 |
| Driver Dysfunctional Impulsivity | | | -.431 | .000 |

### 4.4.17. Impulsive Driver Behavior Scale predicting DSI after controlling for the effects of Dickman Functional/Dysfunctional Scale Factors

Two hierarchical regression analyses were conducted with each DSI factor as the DV in each analysis, entering age, gender and total mileage in the first step as control variables; functional and dysfunctional impulsivity factors of Dickman Funcitonal/Dysfunctional Impulsivity scale in the second step; and the driver urgency, driver lack of premeditation, driver lack of perseverance and driver functional impulsivity factors of Impulsive Driver Behavior Scale in the third step. The aim of utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Behavior Scale explains variance in driver skills (DSI perceptual-motor and safety skills) beyond the general functional and dysfunctional impulsivity factors.

The results of these series of analyses showed that, the four factors of the Impulsive Driver Behavior Scale, entered in the third step increased the explained variance significantly in both of the DSI factors, namely ordinary perceptual-motor skills ($R^2_{change}$ = .28, $F_{change}$ = 61.75, $p$ < .001); and safety skills ($R^2_{change}$ = .30, $F_{change}$ = 60.13, $p$ < .001). This means that driver specific impulsive behavior factors explained variance in both factors of the DSI beyond that explained by general functional and dysfunctional impulsivity factors after controlling for age, gender and total mileage.

Furthermore, in the third step in both analyses, the strength and direction of associations of the four factors of Impulsive Driver Behavior Scale with each DSI factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by Dickman Functional/Dysfunctional Impulsivity Scale factors. It can be claimed that Impulsive Driver Behavior Scale still explained a significant amount of variance in driver skills beyond that explained by general impulsivity (measured by Dickman Functional/Dysfunctional Impulsivity Scale) and a robust pattern of the associations of Impulsive Driver Behavior Scale factors with perceptual-motor and safety skills was observed, since it was not influenced when more control variables/steps were added in the analysis.

**Table 4.20. Hierarchical Regression Analyses**

| **DV: DSI Perceptual-motor Skills** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | .037 | .446 |
| Gender | | | .143 | .003 |
| Total Mileage | | | .133 | .005 |
| 2nd Step: Dickman Scale | .213 | .163 | | .000 |
| Functional Impulsivity | | | .372 | .000 |
| Dysfunctional Impulsivity | | | -.185 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .495 | .282 | | .000 |
| Driver Urgency | | | .110 | .006 |
| Driver Lack of Premeditation | | | .013 | .756 |
| Driver Lack of Perseverance | | | -.028 | .479 |
| Driver Functional Impulsivity | | | .566 | .000 |
| **DV: DSI Safety** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | .241 | .000 |
| Gender | | | -.088 | .059 |
| Total Mileage | | | .106 | .024 |
| 2nd Step: Dickman Scale | .154 | .077 | | .000 |
| Functional Impulsivity | | | .107 | .015 |
| Dysfunctional Impulsivity | | | -.270 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .452 | .298 | | .000 |
| Driver Urgency | | | -.405 | .000 |
| Driver Lack of Premeditation | | | -.256 | .000 |
| Driver Lack of Perseverance | | | -.062 | .141 |
| Driver Functional Impulsivity | | | .221 | .000 |

### 4.4.18. Impulsive Driver Behavior Scale predicting DSI after controlling for the effects of UPPS Impulsive Behavior Scale Factors

Two hierarchical regression analyses were conducted with each DSI factor as the DV in each analysis, entering age, gender and total mileage in the first step as control variables; urgency, lack of premeditation, lack of perseverance and sensation seeking factors of UPPS Impulsive Behavior Scale in the second step; and the driver urgency, driver lack of premeditation, driver lack of perseverance and driver functional impulsivity factors of Impulsive Driver Behavior Scale in the third step. The aim of

utilizing such a stringent sequential approach is to determine whether the Impulsive Driver Behavior Scale explains variance in driver skills (DSI perceptual-motor and safety skills) beyond the general impulsive behaviour (measured by UPPS Impulsive Behavior Scale here).

The results of these series of analyses showed that, the four factors of the Impulsive Driver Behavior Scale, entered in the third step increased the explained variance significantly in both of the DSI factors, namely ordinary perceptual-motor skills ($R^2_{change}$ = .28, $F_{change}$ = 57.61, $p$ < .001); and safety skills ($R^2_{change}$ = .24, $F_{change}$ = 48.92, $p$ < .001). This means that driver specific impulsive behavior factors explained variance in both factors of the DSI beyond that explained by general impulsive behaviour factors after controlling for age, gender and total mileage.

Moreover, in the third step in both analyses, the strength and direction of associations of the four factors of Impulsive Driver Behavior Scale with each DSI factor were in line with the pattern of associations with the analyses conducted without controlling for the variance accounted by UPPS factors. It can be claimed that Impulsive Driver Behavior Scale still explained a significant amount of variance in driver skills beyond that explained by general impulsivity (measured by UPPS) and a robust pattern of the associations of Impulsive Driver Behavior factors with perceptual-motor and safety skills was observed, since it was not influenced when more control variables/steps were added in the analysis.

**Table 4.21. Hierarchical Regression Analyses**

| **DV: DSI Perceptual-motor Skills** | $R^2$ | $R^2_{change}$ | ***Beta*** | ***p*** |
|---|---|---|---|---|
| 1st Step: Control Variables | .050 | .050 | | .000 |
| Age | | | .037 | .446 |
| Gender | | | .143 | .003 |
| Total Mileage | | | .133 | .005 |
| 2nd Step: UPPS Factors | .210 | .159 | | .000 |
| Urgency | | | -.141 | .003 |
| Lack of Premeditation | | | -.095 | .087 |
| Lack of Perseverance | | | -.211 | .000 |
| Sensation Seeking | | | .283 | .000 |
| 3rd Step: Impulsive Driver Behavior Scale | .488 | .279 | | .000 |

| **DV: DSI Perceptual-motor Skills** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
|---|---|---|---|---|
| Driver Urgency | | | .108 | .009 |
| Driver Lack of Premeditation | | | .034 | .435 |
| Driver Lack of Perseverance | | | -.067 | .109 |
| Driver Functional Impulsivity | | | .572 | .000 |
| | | | | |
| **DV: DSI Safety** | $R^2$ | $R^2_{change}$ | *Beta* | *p* |
| 1st Step: Control Variables | .077 | .077 | | .000 |
| Age | | | .241 | .000 |
| Gender | | | -.088 | .059 |
| Total Mileage | | | .106 | .024 |
| 2nd Step: UPPS Factors | .239 | .162 | | .000 |
| Urgency | | | -.183 | .000 |
| Lack of Premeditation | | | -.238 | .000 |
| Lack of Perseverance | | | -.140 | .010 |
| Sensation Seeking | | | .035 | .455 |
| 3rd Step: Impulsive Driver Behavior Scale | .480 | .241 | | .000 |
| Driver Urgency | | | -.397 | .000 |
| Driver Lack of Premeditation | | | -.216 | .000 |
| Driver Lack of Perseverance | | | -.056 | .182 |
| Driver Functional Impulsivity | | | .188 | .000 |

### 4.5. Comparison of the Models

A series of path analyses were conducted to compare the fit of the models in which impulsivity is indirectly associated with number of accidents and offences through its relationship with driver behaviors and skills (see Figure 4.1). First, the fit of the models using the measures of general impulsivity which conceptualized impulsivity as being only dysfunctional (i.e., BIS, UPPS) were compared to the fit of the models integrating both the functional and dysfunctional aspects of general impulsivity (i.e., Dickman Functional/Dysfunctional Impulsivity Scale). Second, the fit of the models with general impulsivity as the distal variable were compared with the fit of the models with driving specific impulsivity as the distal variable.

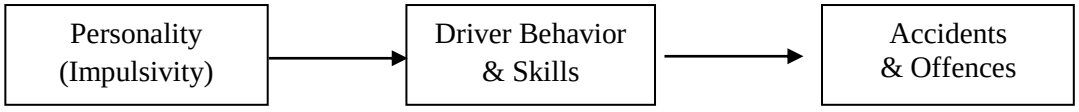


*Figure 4.1*. The general contextual mediated model (adapted from Lajunen, 1997 and Sümer, 2003).

Separate analyses were conducted in AMOS Version 21software with number of accidents as the DV and number of offences as the DV. In addition, for each of the DVs, separate analyses were conducted to test models in which the mediators were driver behaviors (measured by DBQ factors) and the models in which the mediators were driver skills (measured by DSI factors).

### 4.5.1. Comparison of the models using BIS, UPPS Impulsive Behavior Scale and Dickman Functional/Dysfunctional Impulsivity Scale as the distal variables

It was expected that a contextual mediated model integrating both the functional and dysfunctional conceptualization of impulsivity would have better fit than that using only the dysfunctional conceptualization of impulsivity. Hence, it was expected that the model using Dickman Functional/Dysfunctional Impulsivity Scale would have better fit than those with BIS and UPPS scales of general dysfunctional impulsivity. First, this expectation was tested with the analyses conducted using DBQ as the mediator and number of accidents as the DV (see Figure 4.2). However, the model with Dickman`s functional and dysfunctional impulsivity factors as the distal variables had poorer fit ($\chi^2(8) = 409.859$, $p < .001$; RMSEA = .32; CFI = .46) than the model with BIS factors ($\chi^2(9) = 421.123$, $p < .001$; RMSEA = .30; CFI = .64) and the UPPS factors ($\chi^2(10) = 396.470$, $p < .001$; RMSEA = .28; CFI = .64); as CFI values closer to 1 and the RMSEA values lower than .05 indicate good fit.

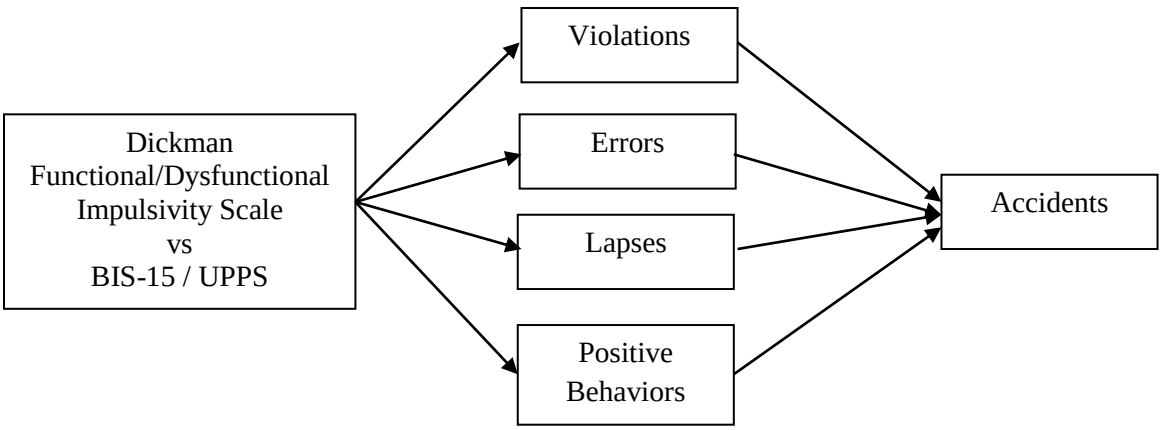


*Figure 4.2.* Comparison of the models with Dickman Functional/Dysfunctional Impulsivity Scale with BIS-15 and UPPS factors as the distal variables

When the fit of the models using Dickman`s, BIS and UPPS scales as the distal variables and DBQ as the mediator were tested with number of offences as the DV this time (see Figure 4.3); again, the model with Dickman`s functional and dysfunctional impulsivity factors as the distal variables had poorer fit ($\chi^2(8) = 408.290$, $p < .001$; RMSEA = .32; CFI = .47) than the model with BIS factors ($\chi^2(9) = 423.84$, $p < .001$; RMSEA = .30; CFI = .65) and the model with UPPS factors ($\chi^2(10) = 393.773$, $p < .001$; RMSEA = .28; CFI = .65) as the distal variables.

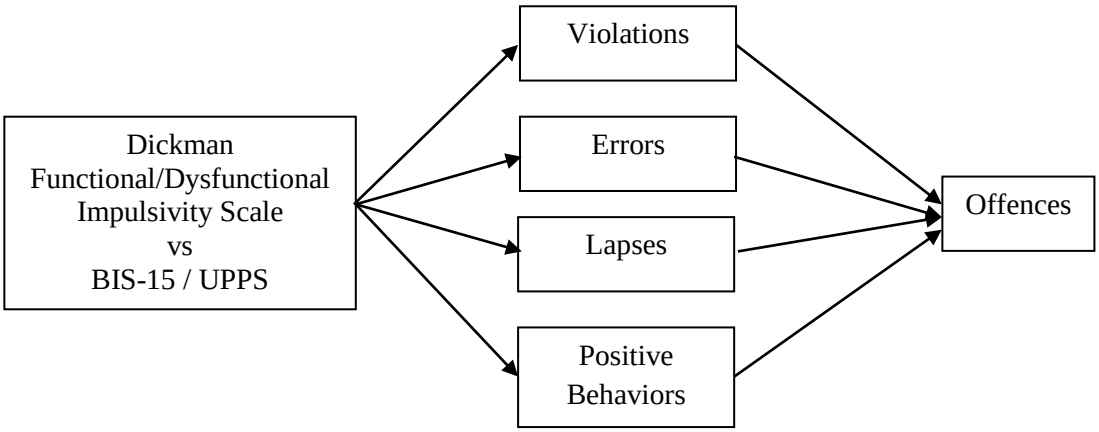


*Figure 4.3*. Comparison of the models with Dickman Functional/Dysfunctional Impulsivity Scale with BIS-15 and UPPS factors as the distal variables

In addition, the models were compared by using driver skills (measured by DSI) as the mediator (Figure 4.4). First, the models with number of accidents as the DV were compared. The results were in line with the analyses with DBQ. That is, again, the model with Dickman`s functional and dysfunctional impulsivity factors as the distal variables had poorer fit ($\chi^2(3) = 51.576$, $p < .001$; RMSEA = .18; CFI = .73) than the model with BIS factors ($\chi^2(4) = 58.944$, $p < .001$; RMSEA = .17; CFI = .90) and the model with UPPS factors ($\chi^2(5) = 42.410$, $p < .001$; RMSEA = .12; CFI = .93) as the distal variables.

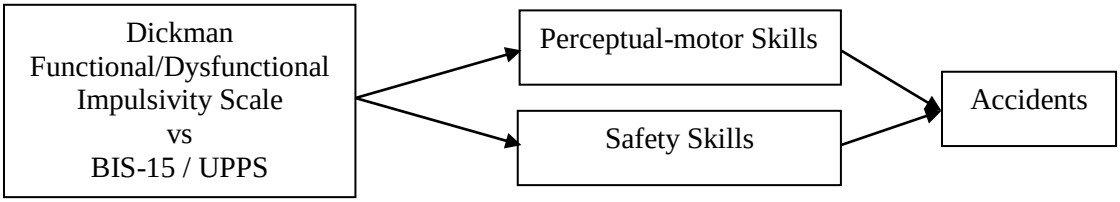


*Figure 4.4.* Comparison of the models with Dickman Functional/Dysfunctional Impulsivity Scale with BIS-15 and UPPS factors as the distal variables

Finally, the fit of the models using Dickman`s, BIS and UPPS scales as the distal variables and DSI as the mediator were tested with number of offences as the DV (see Figure 4.5). Again, the model with Dickman`s functional and dysfunctional impulsivity factors as the distal variables had poorer fit ($\chi^2(3) = 53.036$, $p < .001$; RMSEA = .18; CFI = .77) than the model with BIS factors ($\chi^2(4) = 56.766$, $p < .001$; RMSEA = .16; CFI = .91) and the model with UPPS factors ($\chi^2(5) = 38.820$, $p < .001$; RMSEA = .12; CFI = .94) as the distal variables.

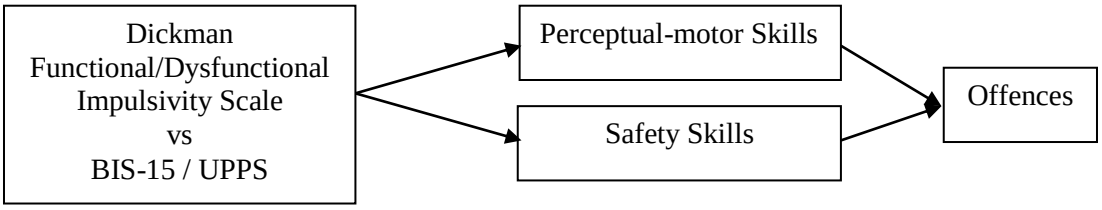


*Figure 4.5.* Comparison of the models with Dickman Functional/Dysfunctional Impulsivity Scale with BIS-15 and UPPS factors as the distal variables

All in all, it can be stated that, the models with Dickman Functional/Dysfunctional Impulsivity scale factors did not have better fit than those with BIS and UPPS factors. Another discernible pattern was that, the models with DSI as the mediator had better fit with both number of accidents and number of offences DVs, and in the models with all three general impulsivity measures as the distal variables.

### 4.5.2. Comparison of the models using driving specific impulsivity and general impulsivity measures as the distal variables

It was expected that a contextual mediated model using driving specific impulsivity integrating both functional and dysfunctional conceptualizations of the construct would have better fit than that using the general dysfunctional conceptualization of impulsivity . Hence, it was expected that the models using the Impulsive Driver Behavior Scale and the Impulsive Driver Scale would have better fit than those with BIS and UPPS scales of general dysfunctional impulsivity.

#### 4.5.2.1. Analyses with Impulsive Driver Behavior Scale Factors

The general contextual mediated model was tested separately by using DBQ and DSI factors as the mediators, and number of accidents and offences as DVs to see if the models using driving specific impulsivity measured by the Impulsive Driver Behavior Scale has better fit than those using general impulsivity measures.

First, this expectation was tested with the analyses conducted using DBQ as the mediator and number of accidents as the DV (see Figure 4.6). As expected, the model with the Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(10) = 278.948$, $p < .001$; RMSEA = .23; CFI = .81) than the model with BIS factors ($\chi^2(9) = 421.123$, $p < .001$; RMSEA = .30; CFI = .64) and the UPPS factors ($\chi^2(10) = 396.470$, $p < .001$; RMSEA = .28; CFI = .64) as the distal variables.

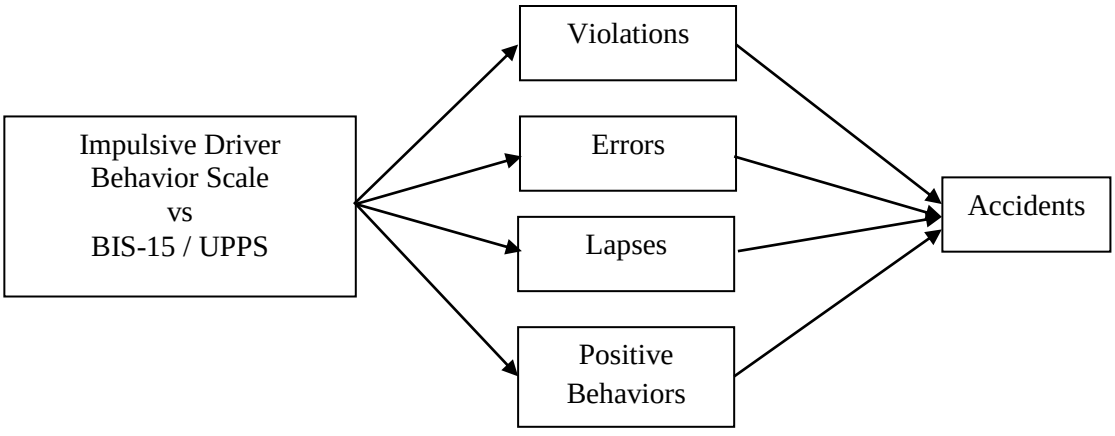


*Figure 4.6.* Comparison of the models with Impulsive Driver Behavior Scale with BIS-15 and UPPS factors as the distal variables

Second, the fit of the models using Impulsive Driver Behavior, BIS and UPPS scales as the distal variables and DBQ as the mediator were tested with number of offences as the DV this time (see Figure 4.7). Again, the model with the Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(10) = 279.082$, $p < .001$; RMSEA = .23; CFI = .81) than the model with BIS factors ($\chi^2(9) = 423.84$, $p < .001$; RMSEA = .30; CFI = .65) and the model with UPPS factors ($\chi^2(10) = 393.773$, $p < .001$; RMSEA = .28; CFI = .65) as the distal variables.

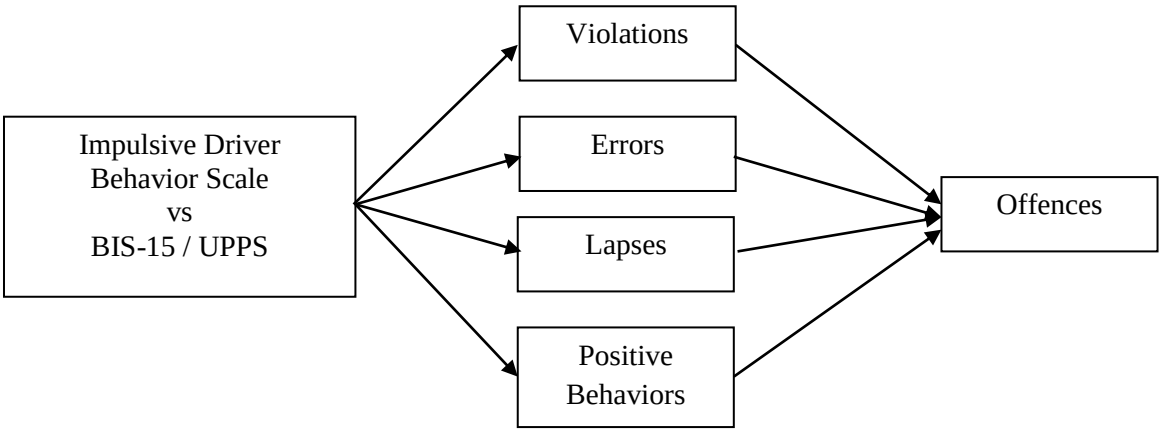


*Figure 4.7.* Comparison of the models with Impulsive Driver Behavior Scale with BIS-15 and UPPS factors as the distal variables

Third, the models were compared by using driver skills (measured by DSI) as the mediator this time (Figure 4.8). First, the models with number of accidents as the DV were compared. The model with the Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(5) = 65.152$, $p < .001$; RMSEA = .15; CFI = .93) than the model with BIS factors ($\chi^2(4) = 58.944$, $p < .001$; RMSEA = .17; CFI = .90); but it had poorer fit than the model with UPPS factors ($\chi^2(5) = 42.410$, $p < .001$; RMSEA = .12; CFI = .93) as the distal variables.

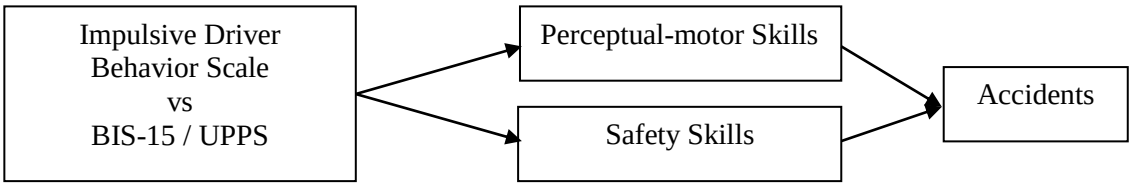


*Figure 4.8.* Comparison of the models with Impulsive Driver Behavior Scale with BIS-15 and UPPS factors as the distal variables

Finally, the fit of the models using BIS, UPPS and Impulsive Driver Behavior Scale factors as the distal variables and DSI as the mediator were tested with number of offences as the DV this time(see Figure 4.9). The model with Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(5) = 62.448$, $p < .001$; RMSEA = .15; CFI = .94) than the model with BIS factors ($\chi^2(4) = 56.766$, $p < .001$; RMSEA = .16; CFI = .91); but it had poorer fit than the model with UPPS factors ($\chi^2(5) = 38.820$, $p < .001$; RMSEA = .12; CFI = .94) as the distal variables.

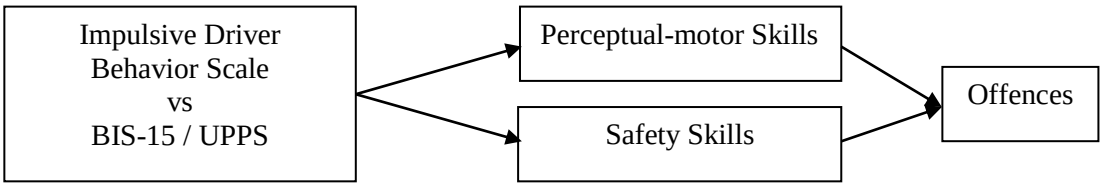


*Figure 4.9.* Comparison of the models with Impulsive Driver Behavior Scale with BIS-15 and UPPS factors as the distal variables

The results partially supported the expectations. That is, the models with driving specific impulsivity as the distal variable had better fit than those with general impulsivity measured by both BIS and UPPS when the mediator was DBQ. However, when the mediator was DSI, models with driving specific impulsivity had better fit than the models with general impulsivity measured by only BIS, whereas it had poorer fit than the models with general impulsivity measured by UPPS.

#### 4.5.2.2. Analyses with Impulsive Driver Scale Factors

The general contextual mediated model was tested separately by using DBQ and DSI factors as the mediators, and number of accidents and offences as DVs to see if the

models using driving specific impulsivity measured by the Impulsive Driver Scale has better fit than those using general impulsivity measures.

First, this expectation was tested with the analyses conducted using DBQ as the mediator and number of accidents as the DV (see Figure 4.10). As expected, the model with the Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(10) = 282.183$, $p < .001$; RMSEA = .26; CFI = .71) than the model with BIS factors ($\chi^2(9) = 421.123$, $p < .001$; RMSEA = .30; CFI = .64) and the UPPS factors ($\chi^2(10) = 396.470$, $p < .001$; RMSEA = .28; CFI = .64) as the distal variables.

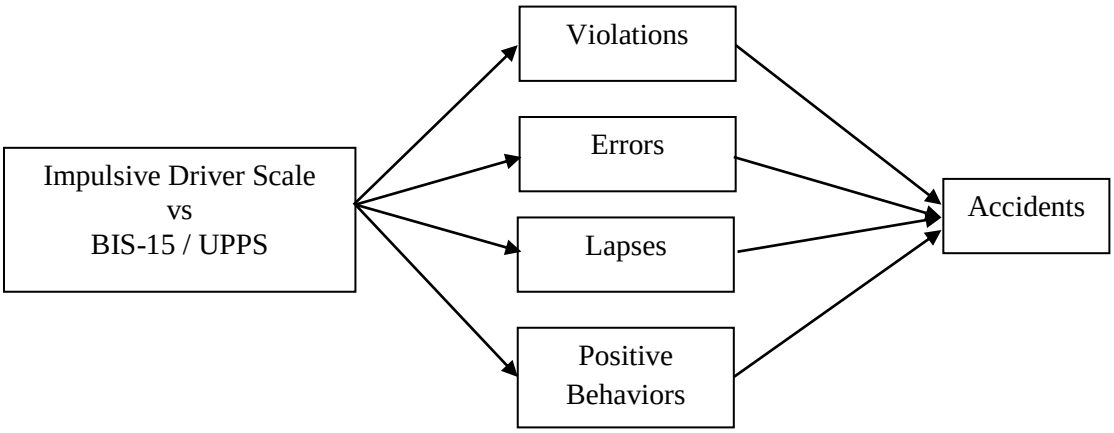


*Figure 4.10*. Comparison of the models with Impulsive Driver Scale with BIS-15 and UPPS factors as the distal variables

Second, the fit of the models using Impulsive Driver, BIS and UPPS scales as the distal variables and DBQ as the mediator were tested with number of offences as the DV this time (see Figure 4.11). Again, the model with the Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(8) = 282.935$, $p < .001$; RMSEA = .26; CFI = .71) than the model with BIS factors ($\chi^2(9) = 423.84$, $p < .001$; RMSEA = .30; CFI = .65) and the model with UPPS factors ($\chi^2(10) = 393.773$, $p < .001$; RMSEA = .28; CFI = .65) as the distal variables.

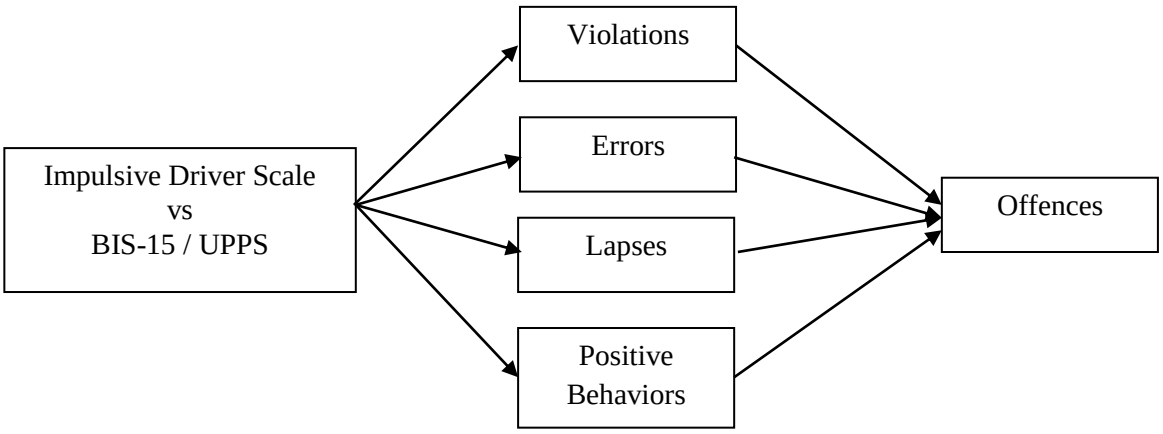


*Figure 4.11*. Comparison of the models with Impulsive Driver Scale with BIS-15 and UPPS factors as the distal variables

Third, the models were compared by using driver skills (measured by DSI) as the mediator this time (Figure 4.12). First, the models with number of accidents as the DV were compared. The model with the Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(3) = 25.844$, $p < .001$; RMSEA = .12; CFI = .95) than the model with BIS factors ($\chi^2(4) = 58.944$, $p < .001$; RMSEA = .17; CFI = .90) and had similar level of fit to the model with UPPS factors ($\chi^2(5) = 42.410$, $p < .001$; RMSEA = .12; CFI = .93) as the distal variables.

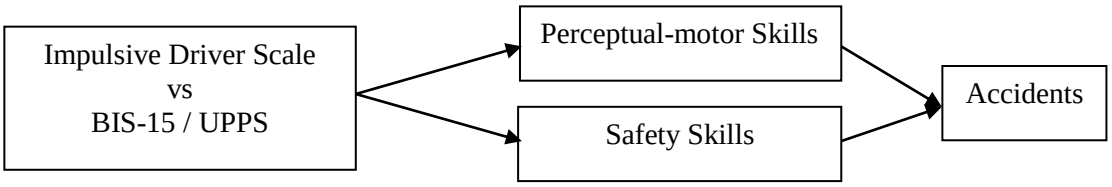


*Figure 4.12.* Comparison of the models with Impulsive Driver Scale with BIS-15 and UPPS factors as the distal variables

Finally, the fit of the models using BIS, UPPS and Impulsive Driver Scale factors as the distal variables and DSI as the mediator were tested with number of offences as the DV this time(see Figure 4.13). The model with Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(3) = 20.388$, $p < .001$; RMSEA = .11; CFI = .96) than the model with BIS factors ($\chi^2(4) = 56.766$, $p < .001$; RMSEA

= .16; CFI = .91); and the model with UPPS factors ($\chi^2(5)$ = 38.820, p < .001; RMSEA = .12; CFI = .94) as the distal variables.

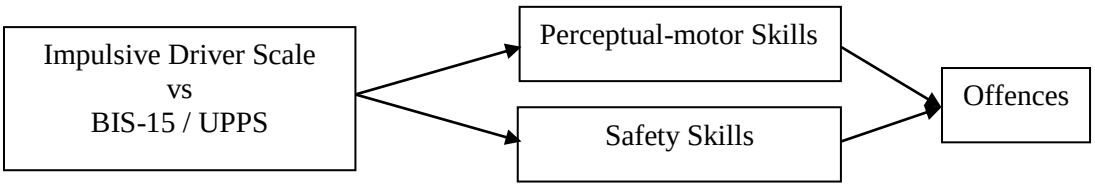


*Figure 4.13.* Comparison of the models with Impulsive Driver Scale with BIS-15 and UPPS factors as the distal variables

The results generally supported the expectations. That is, in all the comparisons presented in this section, the models with driving specific impulsivity as the distal variable had better fit than those with general impulsivity measured by both BIS and UPPS with only one exception. In this case, which was the analysis with DSI as the mediator and number of accidents as the DV, the model with Impulsive Driver Scale had still better fit than the model with BIS and similar fit level with, not poorer than, the model with UPPS.

### 4.5.3. Comparison of the models using driving specific impulsivity and general functional and dysfunctional impulsivity as the distal variables

It was expected that a contextual mediated model using driving specific impulsivity integrating both functional and dysfunctional conceptualizations of the construct would have better fit than that using the general functional and dysfunctional conceptualization of impulsivity. Hence, it was expected that the models using the Impulsive Driver Behavior Scale and the Impulsive Driver Scale would have better fit than those with Dickman Functional/Dysfunctional Impulsivity scale.

#### 4.5.3.1. Analyses with Impulsive Driver Behavior Scale Factors

The general contextual mediated model was tested separately by using DBQ and DSI factors as the mediators, and number of accidents and offences as DVs to see if the models using driving specific impulsivity measured by the Impulsive Driver Behavior Scale have better fit than those using Dickman Functional/Dysfunctional Impulsivity scale.

First, this expectation was tested with the analyses conducted using DBQ as the mediator and number of accidents as the DV(see Figure 4.14). As expected, the model with the Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(10) = 278.948$, $p < .001$; RMSEA = .23; CFI = .81) than the model with Dickman`s functional and dysfunctional impulsivity factors ($\chi^2(8) = 409.859$, $p < .001$; RMSEA = .32; CFI = .46).

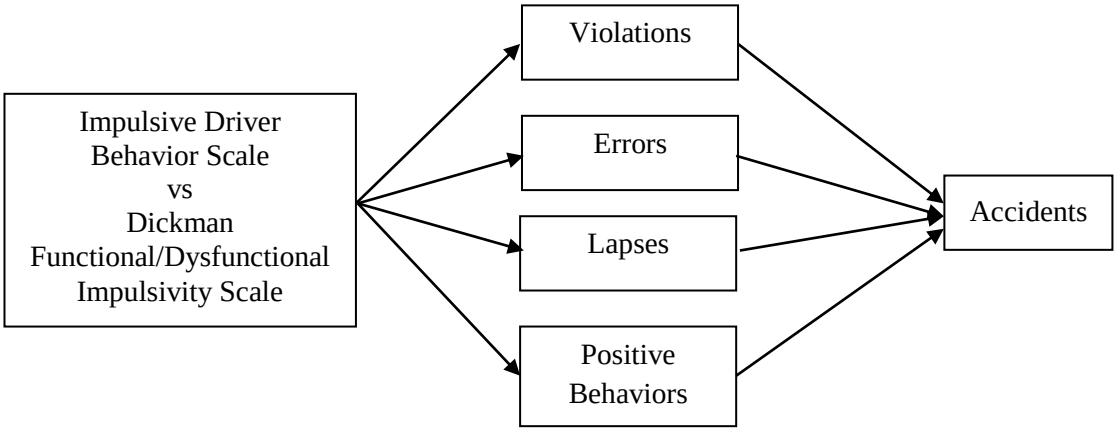


*Figure 4.14*. Comparison of the models with Impulsive Driver Behavior Scale with Dickman Functional/Dysfunctional Impulsivity Scale factors as the distal variables

Second, the fit of the models using Impulsive Driver Behavior Scale and Dickman Functional/Dysfunctional Impulsivity Scale factors as the distal variables and DBQ as the mediator were tested with number of offences as the DV this time (see Figure 4.15). Again, the model with the Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(10) = 279.082$, $p < .001$; RMSEA = .23; CFI = .81) than the model with Dickman`s functional and dysfunctional impulsivity factors ($\chi^2(8) = 408.290$, $p < .001$; RMSEA = .32; CFI = .47).

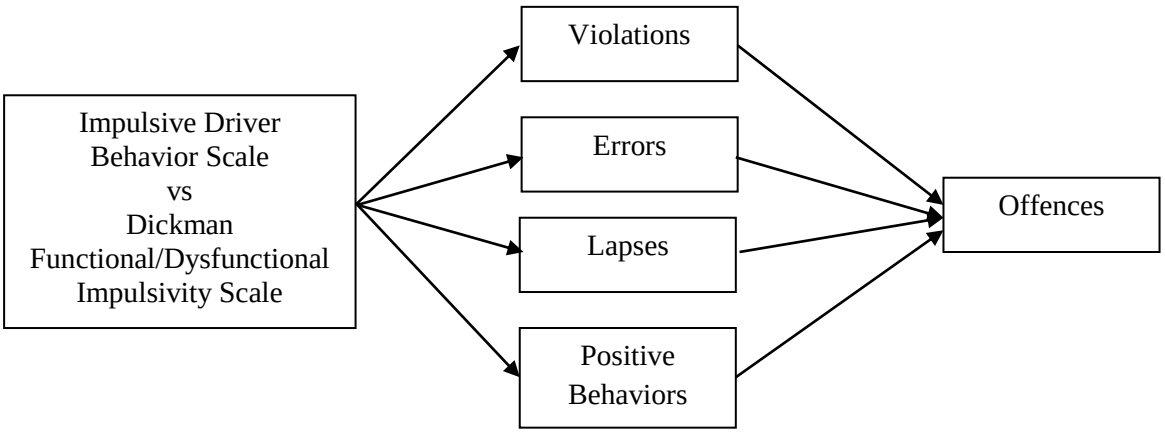


*Figure 4.15*. Comparison of the models with Impulsive Driver Behavior Scale with Dickman Functional/Dysfunctional Impulsivity Scale factors as the distal variables

Third, the models were compared by using driver skills (measured by DSI) as the mediator this time (Figure 4.16). First, the models with number of accidents as the DV were compared. The model with the Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(5) = 65.152$, $p < .001$; RMSEA = .15; CFI = .93) than the model with Dickman Functional/Dysfunctional Impulsivity Scale factors ($\chi^2(3) = 51.576$, $p < .001$; RMSEA = .18; CFI = .73).

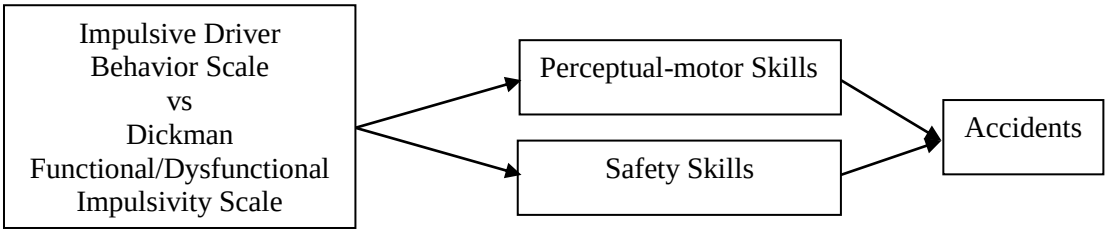


*Figure 4.16.* Comparison of the models with Impulsive Driver Behavior Scale with Dickman Functional/ Dysfunctional Impulsivity Scale factors as the distal variables

Finally, the fit of the models using Impulsive Driver Behavior Scale and Dickman Functional/Dysfunctional Impulsivity Scale factors as the distal variables and DSI as the mediator were tested with number of offences as the DV this time(see Figure 4.17). The model with Impulsive Driver Behavior Scale factors as the distal variables had better fit ($\chi^2(5) = 62.448$, $p < .001$; RMSEA = .15; CFI = .94) than the

model with Dickman Functional/Dysfunctional Impulsivity Scale factors ($\chi^2(3) = 53.036$, $p < .001$; RMSEA = .18; CFI = .77).

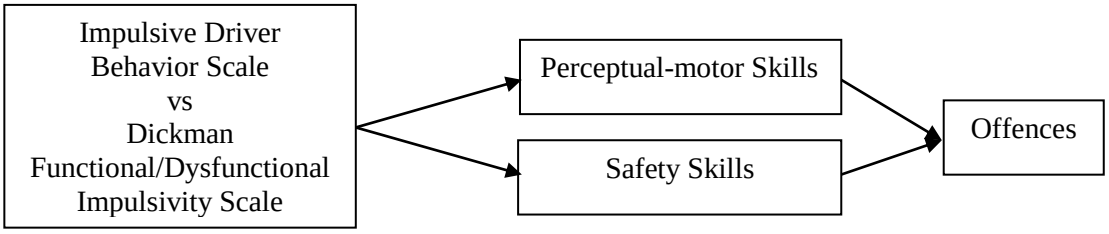


*Figure 4.17.* Comparison of the models with Impulsive Driver Behavior Scale with Dickman Functional/ Dysfunctional Impulsivity Scale factors the distal variables

The results fully supported the expectations. That is, the models with driving specific functional and dysfunctional impulsivity measured by the Impulsive Driver Behavior Scale as the distal variable had better fit than those with general functional and dysfunctional impulsivity measured Dickman`s scale.

#### 4.5.3.2. Analyses with Impulsive Driver Scale Factors

The general contextual mediated model was tested separately by using DBQ and DSI factors as the mediators, and number of accidents and offences as DVs to see if the models using driving specific impulsivity measured by the Impulsive Driver has better fit than those using Dickman Functional/Dysfunctional Impulsivity scale.

First, this expectation was tested with the analyses conducted using DBQ as the mediator and number of accidents as the DV (see Figure 4.18). As expected, the model with the Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(10) = 282.183$, $p < .001$; RMSEA = .26; CFI = .71) than the model with Dickman`s functional and dysfunctional impulsivity factors ($\chi^2(8) = 409.859$, $p < .001$; RMSEA = .32; CFI = .46).

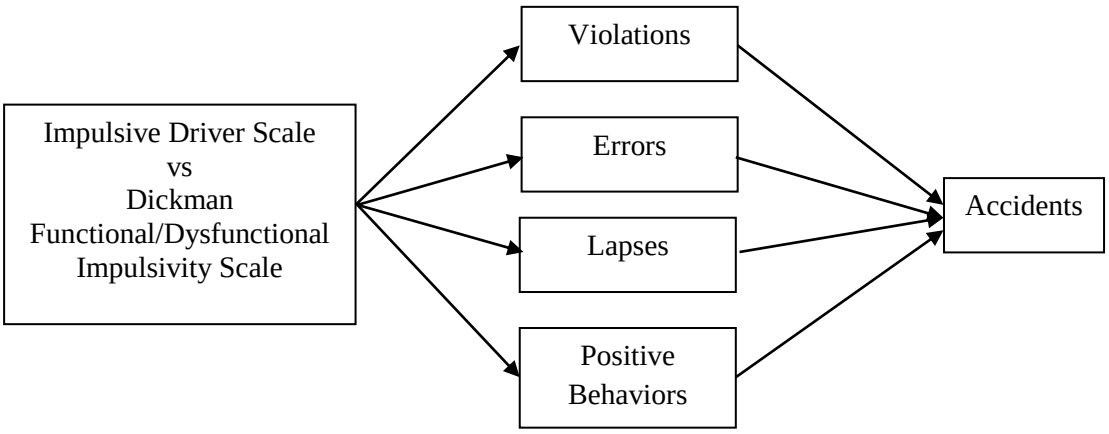


*Figure 4.18.* Comparison of the models with Impulsive Driver Scale with Dickman Functional/ Dysfunctional Impulsivity Scale factors as the distal variables

Second, the fit of the models using Impulsive Driver Scale and Dickman Functional/Dysfunctional Impulsivity factors as the distal variables and DBQ as the mediator were tested with number of offences as the DV this time (see Figure 4.19). Again, the model with the Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(8) = 282.935$, $p < .001$; RMSEA = .26; CFI = .71) than the model with Dickman Functional/Dysfunctional Impulsivity Scale factors ($\chi^2(8) = 408.290$, $p < .001$; RMSEA = .32; CFI = .47) as the distal variables.

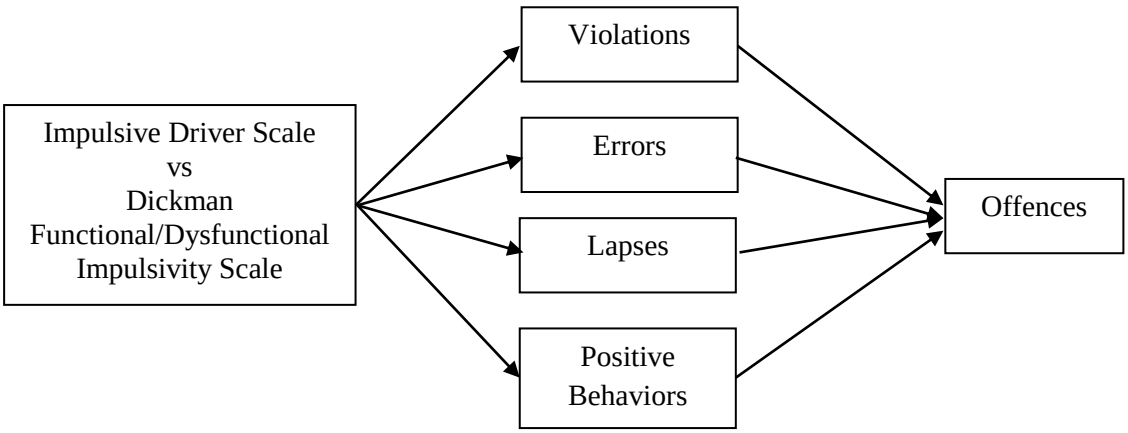


*Figure 4.19.* Comparison of the models with Impulsive Driver Scale with Dickman Functional/ Dysfunctional Impulsivity Scale factors as the distal variables

Third, the models were compared by using driver skills (measured by DSI) as the mediator this time (Figure 4.20). First, the models with number of accidents as the DV were compared. The model with the Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(3) = 25.844$, $p < .001$; RMSEA = .12; CFI = .95) than the model with Dickman Functional/Dysfunctional Impulsivity Scale factors ($\chi^2(3) = 51.576$, $p < .001$; RMSEA = .18; CFI = .73) as the distal variables.

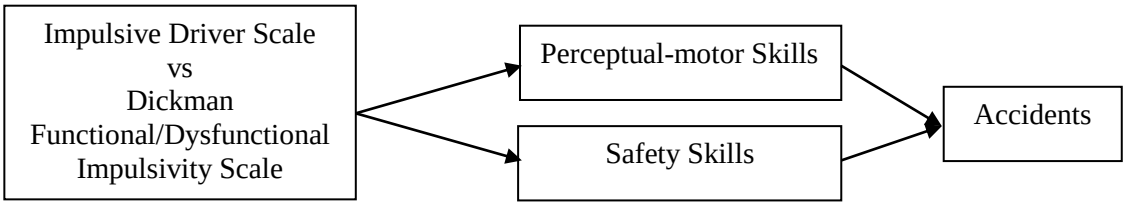


*Figure 4.20.* Comparison of the models with Impulsive Driver Scale with Dickman Functional/ Dysfunctional Impulsivity Scale factors as the distal variables

Finally, the fit of the models using Impulsive Driver Scale factors and Dickman Functional/Dysfunctional Impulsivity Scale factors as the distal variables and DSI as the mediator were tested with number of offences as the DV this time (see Figure 4.21). The model with Impulsive Driver Scale factors as the distal variables had better fit ($\chi^2(3) = 20.388$, $p < .001$; RMSEA = .11; CFI = .96) than the model with Dickman`s functional and dysfunctional impulsivity factors ($\chi^2(3) = 53.036$, $p < .001$; RMSEA = .18; CFI = .77) as the distal variables.

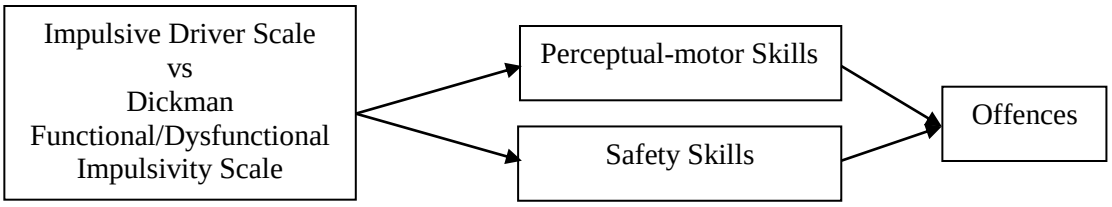


*Figure 4.21.* Comparison of the models with Impulsive Driver Scale with Dickman Functional/ Dysfunctional Impulsivity Scale factors as the distal variables

The results fully supported the expectations. That is, the models with driving specific functional and dysfunctional impulsivity measured by the Impulsive Driver Scale as the distal variable had better fit than those with general functional and dysfunctional impulsivity measured Dickman`s scale.

# CHAPTER 5

# 5. DISCUSSION

## 5.1. Overview

The aim of the present thesis study was to systematically review the literature on the association between impulsivity and driving related outcomes; and based on this synthesis of the literature, integrate the functional conceptualization of impulsivity in the general contextual mediated model to explain accidents and offences. After the systematic literature review presented in Chapter 1, it was concluded that no study up to date has tested conceptual mediated model by considering the functional impulsivity concept in addition to the general impulsivity conceptualized as a dysfunctional personality trait in the literature. To achieve this aim, first a self-report measure of driving specific impulsivity integrating both the dysfunctional and the functional conceptualizations of impulsivity was developed. Then, the fit of the contextual mediated model by using this driving specific impulsivity measure was compared to that when the general impulsivity measures in the literature was used as the distal variable in the model. Two studies were conducted, the first of which was a qualitative study which involved conducting semi-structured interviews to gather as many behavioral examples as possible to serve as items of the driving specific impulsivity scale to be developed. In the second, quantitative, study, the two driving specific impulsivity scales were factor analyzed, validated and the contextual mediated model was tested by using the driving specific impulsivity construct measured by the newly developed scales. In the following sections, the results of the quantitative study will be summarized and discussed, followed by a presentation of the contributions of the present study, limitations and suggestions for future research.

## 5.2. Summary and Discussion of the Results

### 5.2.1. Factor Analyses on the Newly Developed and Adapted Scales

First, the items of the two scales developed in the qualitative study were factor analyzed. These two scales were namely the "Impulsive Driver Behavior Scale", made up of 49behavioral examples and the "Impulsive Driver Scale", made up of 40 adjectives. In addition to these two newly developed scales, Turkish adaptations of the Dickman Functional/Dysfunctional Impulsivity Scale items were factor analyzed.

The results of the factor analysis yielded a clear four-factor structure for the Impulsive Driver Behaviors Scale, which was developed based on two of the most commonly used theoretical conceptualizations of impulsivity in the literature (i.e., BIS and UPPS). While developing the items of this scale, three dimensions of impulsivity common to both of these scales were considered, namely motor impulsivity corresponding to urgency; attentional impulsivity corresponding to lack of perseverance; and nonplanning impulsivity corresponding to lack of perseverance. In addition to items reflecting these three dimensions of impulsivity in the driving context, which reflect dysfunctional impulsivity conceptualization, items of a fourth dimension reflecting functional impulsivity in the driving context were added. This made a four-factor structure, which was also supported by the factor analysis results.

The factor analysis results for the second newly developed scale, namely the Impulsive Driver Scale yielded a two factor structure. The adjectives serving as items of this scale were extracted from the interviews based on the four factor model discussed above. However, as these adjectives were gathered through the semi-structured interviews, the number of items aimed to reflect each of the four dimensions had huge discrepancies. For instance, there were only three adjectives tapping on the lack of perseverance factor, whereas 13 adjectives were listed for the urgency factor. In addition, the highest number of factors were in the functional impulsivity dimension. Hence, the items fit better to a two-factor solution reflecting the functional and dysfunctional impulsivity categorization. The dysfunctional impulsivity factor of this scale was comprised of items reflecting the urgency, lack of premeditation and lack of perseverance dimensions.

The factor analysis results for the Turkish adaptation of the Dickman Functiona/Dysfunctional Impulsivity Scale yielded a clear two-factor solution. Only two items, one from each subscale, were eliminated due to having loadings lower than the determined cut-off value for exploratory factor analytic procedures.

### 5.2.2. Reliability and Validity of the Newly Developed Scales

After factor analyzing the newly developed and adapted scales, a series of analyses were conducted to test the reliability and validity of the scales and then the expectations presented in the literature review section. First, the reliabilities of the subscales, namely the driver urgency, driver lack of premeditation, driver lack of perseverance, driver functional impulsivity subscales of the Impulsive Driver Behavior Scale; driver functional impulsivity and driver dysfunctional impulsivity subscales of the Impulsive Driver Scale; and functional impulsivity and dysfunctional impulsivity subscales of the Dickman Functional/ Dysfunctional Impulsivity Scale, were all found to be satisfactory (i.e., higher than the .70 cut-off value). This means that the items of a given subscale measured a given construct consistently. The question of whether that measured construct by a given subscale was the one that had been intended to be measured was examined by the correlations of the subscales of these newly developed scales and the most widely used and already established impulsivity scales in the literature (i.e., BIS, UPPS).

First, the validity of the Impulsive Driver Behavior Scale was investigated by its subscales` correlations with the factors of BIS, UPPS and Dickman Functional/Dysfunctional Impulsivity Scale. The pattern of correlations revealed that among the associations of the factors of the Impulsive Driver Behavior Scale with those of BIS (i.e., nonplanning, motor and attentional impulsivity), the highest correlations were observed between the intended corresponding factors as a supporting evidence for the convergent validity of the scale. That is, driver urgency had the highest correlation with motor impulsivity of BIS, which was the intended corresponding dimension of general impulsivity to be reflected in the driving context while developing the scale. Similarly, driver lack of premeditation had the highest correlation with nonplanning impulsivity; and driver lack of perseverance had the highest correlation with attentional impulsivity among the three BIS dimensions. In

addition, driver functional impusivity factor of the Impulsive Driver Behavior Scale had a nonsignificant correlation with motor impulsivity factor of BIS, supporting the discriminant validity of the newly developed scale, since motor impulsivity reflects a difficulty to inhibit impulses in general which is not expected to be related to functional impulsivity (Reeve, 2007). Hence, this pattern reveals high convergent validity evidence for the factors of the Impulsive Driver Behavior Scale with the BIS.

In addition to BIS, the validity of the Impulsive Driver Behavior Scale was examined by investigating the pattern of correlations between the factors of this scale and that of UPPS. Driver urgency had the highest correlation with urgency factor among the four factors of UPPS. In addition, driver lack of premeditation had the highest correlation with the lack of premeditation factor among all the factors of UPPS. Driver functional impulsivity factor had the weakest association with urgency factor UPPS among the three factors of interest (i.e., urgency, lack of premeditation, lack of perseverance), which supports the discriminant validity of the newly developed scale. However, driver lack of perseverance factor did not have the strongest association with the corresponding lack of perseverance factor of UPPS. The correlation between driver lack of perseverance with UPPS urgency was stronger than that between driver lack of perseverance and the corresponding lack of premeditation factor of UPPS. The reason of this unexpected finding may be that the items of the lack of perseverance factors reflects a lack of determination to finish a task at hand (e.g., “I tend to give up easily”, “Once I start a project, I almost always finish it”-reversed item), whereas the items of the driver lack of perseverance factor reflects a general difficulty of focusing and concentration on the task at hand (e.g., “While driving, my mind is occupied with things other than driving”, “I may lose my concentration due to music while driving”). The items of this driver lack of perseverance factor were intended to measure the general short attention span feature of impulsivity found in many different conceptualizations in the literature (Whiteside & Lynam, 2001), which also had the highest correlation of the corresponding attentional impulsivity factor of BIS. Therefore, this lower than expected (but still significant) correlation between the driver lack of perseverance factor and the UPPS

lack of perseverance can be attributed to minor content differences of these two subscales.

The pattern of correlations between the Impulsive Driver Behavior Scale and Dickman Functional/Dysfunctional Impulsivity scale also supported the convergent validity of the newly developed driving specific impulsive behaviour scale. The strongest association of Dickman functional impulsivity among the four factors of the driving specific impulsive behavior scale was with the corresponding driver functional impulsivity factor. Driver urgency and driver lack of premeditation factors were nonsignificantly associated with Dickman functional impulsivity subscale, which also supports the discriminant validity of the newly developed scale. Similarly, the negative association between Dickman dysfunctional impulsivity subscale and driver functional impulsivity factor of the newly developed scale was the weakest among the four factors of this driving specific impulsive behavior scale, supporting the discriminant validity. The correlations between Dickman dysfunctional impulsivity and the remaining three factors, namely driver urgency, driver lack of premeditation and driver lack of perseverance subscales, reflecting the three dimensions of impulsivity as a dysfunctional personality trait in the literature, were positive, significant and similar in strength, supporting the convergent validity of the newly developed driving specific impulsive behaviour scale. All in all, the patterns of associations between the Impulsive Driver Behavior Scale and the already established and widely used impulsivity scales in the literature supported the validity of this newly developed scale.

Another scale developed in the first study of the present thesis was the Impulsive Driver Scale made up of adjectives. To evaluate the validity of this newly developed scale, the patterns of correlations between its two factors and the subscales of BIS, UPPS and Dickman Functional/ Dysfunctional Impulsivity scales were examined. First, the correlations between driver dysfunctional impulsivity subscale of the Impulsive Driver Scale and the three factors of BIS, namely motor, nonplanning and attentional impulsivity, were all positive, significant and similar in strength. This supports the convergent validity of the scale since all of these three factors of BIS reflect different dimensions of the general negative conceptualization of impulsivity in the literature. In addition, the correlations between the driver

functional impulsivity subscale of the Impulsive Driver Scale and the three factors of BIS were all negative and weaker than that of driver dysfunctional impulsivity. In fact, the correlation between driver functional impulsivity and motor impulsivity factor of BIS was nonsignificant, supporting the discriminant validity of the Impulsive Driver Scale, since motor impulsivity, like urgency factor of UPPS, reflects a general difficulty in inhibitory control, which is not relevant in the concept of functional impulsivity, as discussed above.

Second, the associations between the two factors of the Impulsive Driver Scale and UPPS were examined. Again, the pattern of correlations yielded support for the validity of the scale. That is, the correlations between driver dysfunctional impulsivity and urgency, lack of premeditation and lack of perseverance factors of UPPS were all positive, significant and much stronger than the negative correlation coefficients between driver functional impulsivity and these three UPPS factors reflecting the general dysfunctional view of impulsivity.

Finally, the associations between the Impulsive Driver Scale factors and Dickman Functional/Dysfunctional Impulsivity Scale were examined. Supporting the convergent validity of the newly developed scale, driver dysfunctional impulsivity factor of the Impulsive Driver Scale was significanlty positively related to the corresponding dysfunctional impulsivity factor of Dickman Scale. However, the driver dysfunctional impulsivity factor was not significantly associated with functional impulsivity factor of Dickman Scale, supporting the discriminant validity of the Impulsive Driver Scale. In addition, the relationship between the driver functional impulsivity factor of the Impulsive Driver Scale and the functional impulsivity factor of the Dickman Scale was positive and much stronger than the negative association between driver functional impulsivity factor and the dysfunctional impulsivity factor of Dickman Scale. All in all, the pattern of associations between the Impulsive Driver Scale and BIS, UPPS, and Dickman Functional/Dysunctional Impulsivity Scale supports the validity of this newly developed scale.

### 5.2.3. Regression Analyses with driving Related Outcomes

#### 5.2.3.1. Comparison of Explained Variance Portions

After the validity of the newly developed two scales have been examined and found to be satisfactory, regression analyses were conducted by controlling for the effects of age, gender and total mileage to avoid their possible confounding effects in the prediction of driver behaviors and skills by using general impulsivity and driving specific impulsivity. Two sets of analyses were conducted at this stage. First, each factor of the Driver Behavior Questionnaire (DBQ) and the Driver Skill Inventory were regressed on the dimensions of each of the general and driver specific impulsivity scales separately. Then, as a second stage, the factors of DBQ and DSI were regressed on different binary combinations of one general impulsivity scale entered in the first step and a driving specific impulsivity scale entered in the second step to test if the driving specific impulsivity concept and the corresponding scale explain a meaningful additional portion of variance in driver behavior and driver skills beyond that explained by a general impulsivity measure.

In the first series of analyses, in which factors of only one impulsivity scale were used as the predictors (after controlling for age, gender and total mileage), the results yielded a general pattern that the Impulsive Driver Behavior Scale and the Impulsive Driver Scale explained twice to three times more variance in driver behavior and skills than that explained by BIS and UPPS. This supports the importance and utility of using a context specific personality scale in predicting behavior and outcomes in that specific context. In addition, another aim of the present thesis study was to integrate the functional/dysfunctional conceptualization of impulsivity (Dickman, 1990) in the driving context and the results also yielded support for the utility of this attempt. For instance, the two factors of the Dickman scale explained more variance than both BIS and UPPS factors when predicting driver perceptual-motor skills and driver lapses and more variance than only BIS factors when predicting driver errors and driver positive behaviors. The reason why Dickman Scale explained less variance than UPPS in some of the outcomes may be that UPPS includes a sensation seeking factor, which is not included in BIS and Dickman Scale, which is also regarded as a distinct trait (Steinberg et al, 2008). Therefore, UPPS factors in total may have explained more variance than BIS, and

more than Dickman Functional/Dysfunctional Impulsivity Scale in some cases, because it measures not only impulsivity, but also another individual difference variable, namely sensation seeking. All in all, the results of the first series of regression analyses using only one impulsivity measure as the predictor and comparing the explained variance proportions, the propositions of the present thesis that functional impulsivity conceptualization should be integrated in the models predicting driver behaviors and skills; and that driving specific impulsivity should be defined, measured and used in explaining driver behaviors and skills found evidence based support.

The second series of regression analyses were conducted by entering one of the newly developed driving specific impulsivity measures after controlling for one of the general impulsivity measures (i.e., BIS, UPPS, Dickman Functional/Dysfunctional Impulsivity Scale) in the preceding step. Again, separate analyses were conducted for each factor of the DBQ and DSI. The newly developed Impulsive Driver Behavior Scale explained a significant additional portion of variance in all dimensions of driver behaviors and skills after UPPS and Dickman Functional/Dysfunctional Impulsivity Scale factors were controlled in the preceding step in separate analyses. In addition, except for a few cases, the strength and direction of the associations of all the factors of the Impulsive Driver Behavior Scale that were found to be significantly related to the outcome measures in the first series of analyses, which did not involve controlling for a general impulsivity measure, were the same. This shows that the Impulsive Driver Behavior Scale better explains driver behaviors and skills than general impulsivity measures of UPPS and Dickman Functional/Dysfunctional Impulsivity Scale.

Moreover, the newly developed Impulsive Driver Scale explained a significant additional portion of variance in all dimensions of driver behaviors and skills after BIS and Dickman Functional/Dysfunctional Impulsivity Scale factors were controlled in the preceding step in separate analyses. Furthermore, again the associations between Impulsive Driver Scale factors and outcome measures that were found to be significant in the first series of analyses that did not involve controlling for general impulsivity, were still significant and in the same direction after controlling for general impulsivity except for a few cases. This indicates that the

Impulsive Driver Scale better explains driver behaviors and skills than general impulsivity measures of BIS and Dickman Functional/Dysfunctional Impulsivity Scale.

All in all, the findings of the second series of regression analyses with both of the newly developed scales strongly proves that it is worth the effort to define and measure driving specific impulsivity. Furthermore, it is evidenced that a using driving specific impulsivity measure would lead to a meaningful increase in our understanding of the links between the trait of impulsivity and driver behaviors and skills.

#### 5.2.3.2. Testing the Expectations of the Proposed Integrative Conceptual Framework

##### 5.2.3.2.1.Driver behaviors as the outcome

Other than the explained variance portions, the pattern of associations of general functional/dysfunctional impulsivity and driving specific impulsivity factors with driving related outcomes were in general supporting the expectations of the proposed integrative conceptual framework presented in Chapter 1. First, in the contextual mediated model integrating functional and dysfunctional impulsivity and positive and negative driver behaviors, it was expected that dysfunctional impulsivity would be negatively associated with positive driver behaviors and positively associated with aberrant or negative driver behaviors, namely violations, errors and lapses. This was the case in the analyses by using the Dickman Functional/Dysfunctional Impulsivity Scale factors; the Impulsive Driver Behavior Scale factors; and the Impulsive Driver Scale factors. Due to the nature of dysfunctional impulsivity involving a tendency to act without forethought and an inability to wait (Reynolds, et al., 2006), it would be reasonable to expect that these individuals would be less likely to engage in behaviors like giving their right to other road users, waiting for pedestrians to pass even though it was their right to pass or park their cars by considering other road users` free movement – some examples of positive driver behaviors. For the same reasons, they would be more likely to engage in violations of traffic rules such as running the red light, overtaking a slow vehicle on the inside, and disregard the speed limits. Furthermore, dysfunctional impulsivity

is associated with difficulty in inhibiting rapid error-prone responses (Reeve, 2007) and therefore they would more likely engage in errors and lapses while driving.

With regard to integration of functional impulsivity in the contextual mediated model integrating functional and dysfunctional impulsivity and positive and negative driver behaviors, first, a positive relationship between functional impulsivity and ordinary violations was expected since functional impulsivity items in Dickman`s Scale and the Impulsive Driver Behavior Scale developed based on Dickman`s (1990) conceptualization measure an individual`s self-rating of his/her competence in thinking and acting fast. Therefore, it was reasoned that these individuals would engage in ordinary violations such as exceeding the speed limits or close following since they trust their fast-responding skills that they can avoid a crash by responding rapidly if these ordinary violations lead to unexpected hazards. However, functional impulsivity factor of Dickman`s Scale, Impulsive Driver Behavior Scale and Impulsive Driver Scale was not found to be significantly related to ordinary violations. This may be because ordinary violations are *behaviors*, and therefore, related to what the driver chooses to do (i.e., driving style) rather than what the driver is capable of doing; and certain personality characteristics influence driving style (Elander et al., 1993). That is, as the distinction between dysfunctional and functional impulsivity regarding the former reflecting a kind of personality trait and the latter reflecting a kind of skill (Reeve, 2007), than it would be reasonable that functional impulsivity, being more of a skill, was not found to be associated with ordinary violations, a component of driving style. Supporting this personality versus skill distinction, an “I do” language is used in the dysfunctional impulsivity items and an “I can” language is used in the functional impulsivity items of both Dickman`s Scale and the newly developed Impulsive Driver Behavior Scale. This was also the reasoning of the second expectation in the integrated model that functional impulsivity would not be associated with aggressive violations. Therefore, this second expectation was fully supported by using functional impulsivity subscale of all the three scales used in the present study, namely Dickman`s Scale, Impulsive Driver Behavior Scale and Impulsive Driver Scale.

Furthermore, a positive association of functional impulsivity with driver errors and lapses was expected, due to the tendency of individuals with high

functional impulsivity to sacrifice accuracy for speed (Reeve, 2007) which may manifest itself in the driving context as driving style focused on fast mobility that may have costs in the form of errors and lapses. However, this was not the case. Rather, a significant negative association of functional impulsivity with errors and lapses was found with all the three measures used (i.e., Dickman`s Scale, Impulsive Driver Behavior Scale and Impulsive Driver Scale). The reason of this negative relationship may be the self-report nature of the measurements. That is, as discussed before, the items of the functional impulsivity subscale of Dickman`s Scale and the Impulsive Driver Behavior scale involve an "I can" language and reflect the individual`s self-ratings of his/her skill level of rapid thinking acting in general measured by Dickman`s Scale and specifically in situations that require rapid thinking and acting while driving measure by the Impulsive Driver Behavior Scale. Therefore, the individuals rating themselves as skilful in terms of rapid thinking and acting may have under-rated or under-reported the frequency of driving errors and lapses they conduct. Or, another explanation may be that although these individuals with high level of functional impulsivity conduct errors and lapses more than those with low levels of functional impulsivity, they do not experience any kind of negative outcome thanks to their fast responses to avoid collisions or other unpleasant outcomes in traffic. By this way, their image of a "skilful driver" may be negatively reinforced and they may disregard their error prone style which, in the first place, led to that potentially risky situation.

Finally, a negative relationship between functional impulsivity and positive driver behaviors was expected in the integrated framework. It was reasoned that if individuals with high functional impulsivity focus on speed while completing a task at hand, than it they would be less inclined for behaviors that may slow them down in completing that task. For instance, drivers having high functional impulsivity would not give their way to other road users when the right to pass is theirs or let pedestrians cross, not because they are "rude", but because they do not want to sacrifice their speed in getting where they intend to. However, this was again not the case, functional impulsivity factor of all the three scales was found to be significantly positively associated with positive driver behaviors. It can be argued that the expectation of a negative relationship between functional impulsivity and positive

driver behaviors was based on some of the items involving giving their way or wait for others to pass which are linked with slowing down. However, there were other items of the positive driver behaviors subscale that do not have anything to do with sacrificing speed, and some items involved behaving in a "wise" manner to take care of the traffic environment such as arranging speed to help a driver trying to overtake or signalling the driver behind you by that s/he can overtake in the situations when that driver`s vision of that portion of the road is impeded. These behaviors in a way reflect a kind of alertness and rapid information processing in traffic, which are mostly related to functional impulsivity. Therefore, these kinds of behaviors may be differentiating the individuals having high levels of functional impulsivity than those having high levels of dysfunctional impulsivity. To sum up, the results partially supported the propositions of the integrative conceptual framework for driving style/behavior.

#### 5.2.3.2.2. Driver skills as the outcome

In the conceptual framework for driving skills/performance, an indirect relationship between functional and dysfunctional with accidents and offences through driving skills was proposed. In general, perceptual-motor skills are considered to be related to information processing and motor skills, and safety skills to be linked with attitudes and personality factors (Martinussen et al., 2014). Similarly, as discussed before, functional impulsivity was considered to be a kind of skill while dysfunctional impulsivity was considered to reflect a personality trait (Reeve, 2007). Hence, it was expected that functional impulsivity would be more strongly associated with perceptual-motor skills than it would be with safety skills; and oppositely, dysfunctional impulsivity would be more strongly associated with safety skills than it would be with perceptual-motor skills. This proposition was supported by data in the analyses using the functional and dysfunctional impulsivity subscales of all the three scales used.

In addition to the strength of the associations, specific expectations in terms of the directions of these associations were presented. First, it was expected that functional impulsivity would be positively related to perceptual-motor skills, as individuals rating themselves as highly skilful in rapid thinking and acting would do

so in the driving task. This expected significant positive relationship was supported by data in the analyses using functional impulsivity subscale of all the three scales used. On the other hand, a negative relationship between functional impulsivity and safety skills was expected due to the general finding in the literature that as the perceptual-motor skill level of the drivers increase, their consideration for safety, and thereby, safety skills decrease (Lajunen et al., 1998; Martinussen et. al., 2014; Sümer et al., 2006). However, results did not yield support for this expectation. In all the analyses using the three different measures, functional impulsivity dimension was significantly positively associated with safety skills. These associations were much weaker than that between functional impulsivity and perceptual-motor skills though, which supports the first expectation that functional impulsivity would be more strongly related to perceptual-motor skills because it is a kind of skill and less strongly related to safety skills because safety skills are more affected by personality and attitudes. But, this positive relationship between functional impulsivity and safety skills may be explained the distinction between functional and dysfunctional impulsivity in general. That is, both functional and dysfunctional impulsivity are associated with quick responding without elaboration, but functional impulsivity involves acting this way when this is the optimal way and when it has positive consequences (Dickman, 1990). Hence, it can be argued that individuals with high levels of functional impulsivity still consider for safety although their primary focus is speed than accuracy, thanks to their alertness and attentional capacity. In the driving context, this consideration for safety combined with their perceptual-motor skills may be the feature that makes them "functionally impulsive".

Second, dysfunctional impulsivity was expected to be negatively associated with perceptual-motor skills due to its detrimental effects on performance of cognitive tasks that demand fixed attention (Dickman, 2000). This expectation was supported in the analyses with dysfunctional impulsivity subscale of Dickman`s scale and that of the Impulsive Driver Scale. In addition, dysfunctional impulsivity was expected to be negatively related to safety skills since dysfunctional impulsivity, reflecting the general negative personality trait of impulsivity, involves a lack of future orientation and acting without considering the consequences (Whiteside & Lynam, 2001) which is the core concept of safety. Results yielded support for this

expectation in both of the analyses using the dysfunctional impulsivity subscale of the Dickman`s Scale and the Impulsive Driver Scale. All in all, with a few exceptions, it can be concluded that the results of the regression analyses supported the proposed associations in the integrative conceptual framework for driving skills/performance.

### 5.2.4. Model Fit Comparisons

Finally, a series of path analyses were conducted to compare the proposed integrative conceptual frameworks for driver behaviors and driving skills by using general impulsivity scales and by the newly developed driving specific impulsivity scales. Parallel with the first aim of the present thesis to integrate the functional impulsivity conceptualization in the contextual mediated model, the fit of the models by using general impulsivity measured by BIS and UPPS that only reflect the dysfunctional conceptualization of impulsivity trait were compared to that of the model by using the functional/dysfunctional conceptualization of impulsivity measured by Dickman`s scale. A better fit of the models integrating functional/dysfunctional impulsivity than the models with general dysfunctional impulsivity was expected, but this was not supported by the data. In all of the four models involving driver behaviors and skills as the mediators, and accidents and offences as the criteria, Dickman Functional/Dysfunctional Impulsivity scale factors had poorer fit than those with BIS and UPPS factors. This was also the case in some of the regression analyses while comparing the explained variance portions. For instance, Dickman`s scale explained a higher amount of variance than BIS and UPPS only in driver perceptual-motor skills and lapses; and explained a smaller amount of variance than BIS and UPPS in safety skills, ordinary violations and aggressive violations. However, as evidenced by the systematic literature review presented in Chapter1, this was the first study in the literature to investigate the links between Dickman Functional/Dysfunctional Impulsivity Scale and driver behaviors and offences measured by self-report scales. Therefore, the reason why using a broader conceptualization of impulsivity did not yield better results than using only the dysfunctional view of impulsivity in explaining accidents and offences should be investigated by future studies.

The second aim of the present thesis study was to develop a driving specific impulsivity measure and compare general impulsivity measures with this newly developed impulsivity measures in terms of explaining variance in driving related outcomes. In the regression analyses, this comparison was made by using the dimensions of driver skills and driver behaviors as the criteria and found to that driving specific impulsivity scales explained better variance than general impulsivity in general. This time, driver behaviors and driver skills were used as mediators in explaining the relationship between impulsivity and accidents and offences. The fit of the models using driving specific impulsivity measured by both the Impulsive Driver Behavior Scale and the Impulsive Driver Scale was found to be better than the model using BIS in all of the comparisons, and better than the model using UPPS in some but not all of the analyses. The reason of the model using UPPS yielding better fit in some cases may be that UPPS includes a sensation seeking dimension, which is a distinct construct (Steinberg et al, 2008) as discussed before. In future studies, this argument should also be tested. All in all, it can be argued that the contextual mediated model had better fit when driving specific impulsivity is used as the distal variable than when general impulsivity is used.

The final comparison was between the models using driving specific functional and dysfunctional impulsivity measured by the newly developed scales versus general functional impulsivity measured by Dickman Functional/Dysfunctional Impulsivity Scale. The results yielded full support for the expectation that models with driving specific impulsivity as the distal variables would have better fit than the models with general functional and dysfunctional impulsivity. In all the comparisons, involving models with both of the newly developed scales for measuring driving specific impulsivity as the distal variables; driver behaviors and driver skills as the mediators; and accidents and offences as the criteria, the models with the driving specific impulsivity measures yielded better results than those with general functional and dysfunctional impulsivity measured by Dickman`s scale.

To sum up, the results of the model fit comparisons showed that the contextual mediated model by using driving specific impulsivity as the distal variable had better fit than the contextual mediated model using general impulsivity as a

negative personality trait and general functional/dysfunctional impulsivity. This supports the importance of defining the construct of driving specific impulsivity and developing and using self-report measures to assess this construct. In addition, the results partially supported the integration of the functional/dysfunctional conceptualization of impulsivity in the driving context. Since this was the first study to investigate the links between functional/dysfunctional impulsivity conceptualization and self-reported driver behaviors and skills; more studies on this issue using different methods and techniques would help clarify these links.

### 5.3. Contributions of the Present Study

The first contribution of the present thesis is the systematic literature review of the association between impulsivity and driving related outcomes presented in Chapter 1. Although there has been a review of this sort on sensation seeking (Jonah, 1997), a related but distinct construct (Steinberg et al, 2008), it is surprising that this is the first systematic review investigating the links between impulsivity and driving related outcomes. Moreover, after synthesizing the studies that met the inclusion criteria, a new integrative conceptual framework for driver behaviors and driving skills were proposed based on the findings. Finally, the relatively less studied constructs in the literature and suggestions for future research that may contribute to overcoming the gaps have been presented. For instance, although the database search was conducted by using word pairs such as “driver & impulsivity”; “driving & impulsivity”; “driver & impulsiveness”; and “driving & impulsiveness”; the search resulted in no study that had examined the association of impulsivity personality trait with driver/driving skills. This surprising since it has been evidenced that especially driver safety skills has been influenced by driver personality and attitudes (Martinussen et al., 2014). Hence, another contribution of the present thesis is investigating the links between impulsivity and driving skills. Similarly, there has been no study investigating the relationship between impulsivity and positive driver behaviors in the literature. This may be because impulsivity has been regarded as dysfunctional and negative personality trait and therefore it has been mostly investigated in the realm of negative driver behaviors and driver risk taking. This study is the first one in the literature that examined the links between impulsivity and positive driver behaviors.

Another major contribution of the present thesis is the proposition of integrating the concept of functional impulsivity in the driving context. The systematic literature review showed that there were a few studies in the literature that had investigated the links between functional impulsivity and risk taking. These studies conducted by the same research group and used actual offence records. However, no study up to date has examined this link between functional impulsivity and driver behaviors by using the Driver Behavior Questionnaire (DBQ). This is another contribution of the current thesis study. In addition, the functional impulsivity concept has never been studied witha Turkish sample and this has been the first study to adapt the Dickman Functional/Dysfunctional Impulsivity Scale to Turkish and use this newly adapted version with a Turkish sample. Hence, adaptation of the Turkish version of this scale and investigating functional impulsivity in this culture is another contribution of the present thesis study.

Finally, the systematic literature review showed that there has been a lack of consensus on the definition of impulsivity in the literature and there has been many different scales based on these different conceptualizations. To some degree, the mixed results may be attributed to this lack of a unitary conceptualization of the trait at hand. In addition, while developing the Traffic Locus of Control Scale (2005b), Özkan and Lajunen argued that the most accurate findings have been achieved by using measures that tailor the construct more specifically to the target behaviors rather than using general measures of locus of control. Hence, due to the lack of a widely accepted unitary conceptualization of impulsivity in the literature and since measurements of constructs to that target the behaviour in that specific context would have higher explanatory power in the target behaviour; a definition of driving specific impulsivity has been made. Based on this definition, two self-report scales have been developed as part of the present thesis work to measure driving specific impulsivity. These scales have been found to have good psychometric properties in addition to having higher explanatory power in driver behaviors and skills than the most widely used general impulsivity scales in the literature. Development and validation of these two driving specific impulsivity scales were the major contribution of the present thesis to the relevant literature.

In addition to the theoretical contributions, the present study had some practical contributions regarding the sample of the study used. The results of the systematic literature review indicated a need for studies using populations other than samples of drivers from industrialized countries and samples composed of only university students. The quantitative study conducted as the second study of the current thesis used a Turkish sample with a wide age range (19 – 76 years). In addition, only 25 % of the sample were university students and the great majority of the sample had a variety of professions. By having a sample with very different features than the samples of the majority of studies examining the links between impulsivity and driving related outcomes, the present study had contributed to the relevant literature.

### 5.4. Limitations and Suggestions for Future Studies

The first limitation may be considered a technical issue. As mentioned in the method section of the systematic literature review, there were five publications listed in the database that include the keywords used for the review in their titles, abstracts or keywords that could not be reached, neither in terms of abstracts nor full-text. Hence, these five publications may or may not meet the inclusion criteria of the systematic literature review; and if yes, these five publications may have studied the concepts that is considered to be lacking in the relevant literature.

Another limitation of the present study is the cross-sectional nature involving Data collection on all of the variables of interest at once and examining the associations between these variables. A major disadvantage of utilizing cross-sectional studies is the

lack of evidence to establish causality, which applies to the present study as well. In addition, it may be important to investigate personality effects on driver behaviors, skills, accidents and offences via longitudinal studies which enhances the understanding of this link as the driver gets more and more skilful in driving. In addition, the mechanisms influencing how personality affects driving related outcomes may change with age. Therefore, the investigation of the links between personality in general, and specifically impulsivity, and driving related outcomes in a longitudinal manner would be an important contribution.

Utilizing only self-report method of data collection is another limitation of the present study. The drawback of using only self-report may have caused a common method bias. This may lead to the possibility that the significant associations found between the variables may partially be attributed to measuring all of these variables by using self-report. In addition to the issue of common method variance, using self-report measurement to assess driver behaviors and skills have some other shortcomings. For instance, drivers may not always be aware of their automated processes and behaviors (Lajunen & Özkan, 2011) and therefore may under-report some of these behaviors in an unintended way. In addition, intended under-reports are also possible due to social desirable responding. Therefore, future studies investigating the links between personality and driving related outcomes that use measures other than self-report, such as simulated driving scenarios, driving behavior and skills data taken on the instrumented cars or actual police records may be of great value.

The convenience sampling approach used in the present study may be considered as another limitation that reduces the generalizability of the results. Future studies on the same issue that utilize a more random sampling strategy would be important in terms of the generalizability of the results to larger populations.

Finally, the link between impulsivity and driving related outcomes has never been studied in the professional driver sample, therefore future studies using professional driver populations would have the potential to make significant contributions to the relevant literature.

### 5.5. Conclusion

The aim of the present thesis was to systematically review the literature on the association between impulsivity and driving related outcomes; and based on this systematic review, to integrate the functional conceptualization of impulsivity in the general contextual mediated model to explain accidents and offences; and develop a "driving specific impulsivity" measurement that includes both the functional and dysfunctional conceptualizations of impulsivity. In the first part, a qualitative study was conducted to develop the driving specific impulsivity measure. In the second part, a quantitative study was conducted to validate the newly developed and adapted scales, compare the explanatory power of the newly developed scales with the widely

used general impulsivity scales in the literature, and test the associations proposed in the integrative conceptual framework for driving style/behaviour and performance/skills. The results yielded support for the expectations in general. In addition, the comparisons of the explained variance portions by driving specific impulsivity measures and by general impulsivity scales proved that driving specific impulsivity explains better variance in driver behaviors and skills than general impulsivity.

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# APPENDICES

## Appendix A: Questionnaire Package

### Gönüllü Katılım Formu

Orta Doğu Teknik Üniversitesi (ODTÜ) İnsan Araştırmaları Etik Kurulu tarafından onaylanmış olan bu araştırma ODTÜ Psikoloji Bölümü doktora programı öğrencisi Pınar Bıçaksız tarafından tez çalışması kapsamında yürütülmektedir. Çalışmanın amacı, kişilik faktörlerinin araç kullanma veya trafikteki sürücü davranışlarına etkisini incelemektir. Anketin tamamlanması yaklaşık 15-20 dakika sürmektedir. Çalışmada, kimlik belirleyici hiçbir bilgi istenmemektedir. Anket formları gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler sadece bilimsel yayımlarda kullanılacaktır.

Çalışma genel olarak kişisel rahatsızlık verecek bir etkileşim içermemektedir. Ancak, katılım sırasında her hangi bir nedenden ötürü kendinizi rahatsız hissederseniz çalışmayı bırakmakta serbestsiniz. Bu çalışmaya katıldığınız için şimdiden çok teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için ODTÜ Psikoloji Bölümü öğretim üyelerinden Doç. Dr. Türker Özkan (Oda No: B123; Tel: 0312 210 5118; E-posta: ozturker@metu.edu.tr) veya öğrencilerinden Pınar Bıçaksız (Oda No: BZ08; Tel: 0312 210 31 54; E-posta: pbicaksiz@gmail.com ) ile iletişim kurabilirsiniz.

***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).

Tarih İmza

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SÜRÜCÜ BİLGİ FORMU

1. Yaşınız:_____ 2. Cinsiyetiniz: □ Kadın □ Erkek 3. Mesleğiniz: _____

4. Eğitim durumunuz:_____ 5. Ne kadar süredir ehliyet sahibisiniz? ___ _____ Yıl

6. Geçen yıl yaklaşık olarak toplam kaç km araç kullandınız? _____ Km

7. Bugüne kadar tahmini toplam kaç km araç kullandınız? _____ Km

8. Ticari (profesyonel) amaçla mı araç kullanıyorsunuz? □ Evet □Hayır

Eğer cevabınız Evet ise ne tür araç kullanıyorsunuz (taksi, ağır vasıta vb.)____ _____

9. Ne kadar sıklıkla aşağıda belirtilen durumlarda araç kullandığınızı aşağıdaki tabloda ilgili rakamı işaretleyerek belirtiniz:

| | Hergün | Haftada bir kez | Ayda iki kez | Ayda bir kez | 6 ayda bir kez |
|---|---|---|---|---|---|
| Kış aylarında | 1 | 2 | 3 | 4 | 5 |
| Yoğun araç trafiğinde | 1 | 2 | 3 | 4 | 5 |
| Otobanda | 1 | 2 | 3 | 4 | 5 |
| Diğer ana yollarda | 1 | 2 | 3 | 4 | 5 |
| Şehiriçi yollarda | 1 | 2 | 3 | 4 | 5 |
| Şehirlerarası yollarda | 1 | 2 | 3 | 4 | 5 |
| Genellikle her durumda | 1 | 2 | 3 | 4 | 5 |

10. Son üç yıl içerisinde küçük ya da büyüklüğüne bakmazsızın, nedeni ne olursa olsun, başınızdan geçen kaza sayısı kaçtır? _____

Bu kazaların kaç tanesinde hatalı taraftınız? _____

Bu kazaların kaç tanesi aktif (sizin bir araca yayaya veya nesneye çarptığınız kazalar) kazaydı? ___

Bu kazaların kaç tanesi yaralanma veya can kaybıyla sonuçlandı? _____

11. Son üç yıl içerisinde, aşağıda belirtilen trafik cezalarını kaç kere aldığınızı belirtiniz.

a) Yanlış park etme_____ b) Hatalı sollama_____ c) Aşırı hız_ _____

d) Kırmızı ışıkta geçme_____ e) Alkollü araç kullanma_____

f) Diğer (eksik ekipman, kırık far vb.)_____

12. Hava ve yol koşulları uygun olduğunda şehirlerarası yollarda yaklaşık ortalama kaç kilometre hızla gidersiniz?_____ km/saat

13. Hava ve yol koşulları uygun olduğunda şehir içi yollarda yaklaşık ortalama kaç kilometre hızla gidersiniz?_____ km/saat

14. Normal bir seyahatinizde kendinizi diğer sürücülerle kıyasladığınızda yaptığınız sollamalarınızın sayısı sollandığınıza oranla nedir?

Yaptığım sollamaların sayısı sollandığımdan azdır. □

Yaptığım sollamaların sayısı sollanmalarımla hemen hemen eşittir. □

Yaptığım sollamaların sayısı sollanmalarımdan fazladır. □

15. Son üç yılda şehir içinde hız yaptığınız için kaç tane trafik cezası aldınız?__- _____

_

16. Son üç yılda şehir dışında hız yaptığınız için kaç tane trafik cezası aldınız?_____

17. Hız limiti 50 km/saat olan şehir içi yollarda hangi hızla gitmeyi tercih edersiniz?_____km/saat

18. Hız limiti 90 km/saat olan şehir dışı yollarda hangi hızla gitmeyi tercih edersiniz? ____ km/saat

İnsanlar farklı durumlarda gösterdikleri düşünce ve davranışları ile birbirlerinden ayrılırlar. Aşağıdaki cümlelerde bazı durumlarda nasıl düşündüğünüzü ve davrandığınızı ölçen ifadeler bulunmaktadır. Lütfen her bir cümleyi okuyunuz ve sağındaki, size en uygun olan rakamı işaretleyiniz. Cümlelerin doğru ya da yanlış cevabı yoktur, önemli olan sizin ne yaptığınız veya düşündüğünüzdür. Cevaplamak için çok zaman ayırmayınız. Hızlı ve dürüstçe cevap veriniz.

| | | Nadiren/Hiçbir zaman | Bazen | Sıklıkla | Hemen her zaman/Her zaman |
|---|---|---|---|---|---|
| **1** | İşlerimi dikkatle planlarım | 1 | 2 | 3 | 4 |
| **2** | Dikkatli düşünen birisiyim | 1 | 2 | 3 | 4 |
| **3** | İş güvenliğine dikkat ederim | 1 | 2 | 3 | 4 |
| **4** | Düşünerek hareket ederim | 1 | 2 | 3 | 4 |
| **5** | Geleceğini düşünen birisiyim | 1 | 2 | 3 | 4 |
| **6** | Uçuşan düşüncelerim var | 1 | 2 | 3 | 4 |
| **7** | Aklıma estiği gibi hareket ederim | 1 | 2 | 3 | 4 |
| **8** | Düşünmeden alışveriş yaparım | 1 | 2 | 3 | 4 |
| **9** | Hobilerimi değiştiririm | 1 | 2 | 3 | 4 |
| **10** | Kazandığımdan daha fazla harcarım | 1 | 2 | 3 | 4 |
| **11** | Düşünmeden iş yaparım | 1 | 2 | 3 | 4 |
| **12** | Dikkat etmem | 1 | 2 | 3 | 4 |
| **13** | Düşünmeden bir şeyler söylerim | 1 | 2 | 3 | 4 |
| **14** | Düşünmeden hareket ederim | 1 | 2 | 3 | 4 |
| **15** | Zor problemler çözmem gerektiğinde kolayca sıkılırım | 1 | 2 | 3 | 4 |

Lütfen aşağıda verilen maddelerin her birini sizin kendinizin **ARAÇ KULLANIRKEN SERGİLEDİĞİNİZ DAVRANIŞLARI** ne ölçüde yansıttığını 5`li ölçek üzerinde en uygun olduğunu düşündüğünüz rakamı işaretleyerek değerlendiriniz.

Bu ölçekte;

**1: Beni hiçbir şekilde yansıtmıyor**
**2: Genel olarak beni yansıtmıyor**
**3: Beni ne yansıtıyor ne de yansıtmıyor**
**4: Genel olarak beni yansıtıyor**
**5: Beni tamamen yansıtıyor**

olarak tanımlanmıştır.

| | | **Beni hiçbir şekilde yansıtmıyor** | **Genel olarak beni yansıtmıyor** | **Beni ne yansıtıyor ne yansıtmıyor** | **Genel olarak beni yansıtıyor** | **Beni tamamen yansıtıyor** |
|---|---|---|---|---|---|---|
| **1** | Tüm trafik kurallarına uyarak araç kullanırım. | 1 | 2 | 3 | 4 | 5 |
| **2** | Acelem olmasa da araç kullanırken hiçbir şekilde trafikte beklemeye veya yavaş gitmeye tahammül edemem. | 1 | 2 | 3 | 4 | 5 |
| **3** | Tehlike anında kuvvetli refleks göstererek kurtarırım. | 1 | 2 | 3 | 4 | 5 |
| **4** | Arkadan gelen bir araç olmasa bile sinyal veririm. | 1 | 2 | 3 | 4 | 5 |
| **5** | Yapmamam gerektiğini bildiğim halde hızlı sürmekten kendimi alamam. | 1 | 2 | 3 | 4 | 5 |
| **6** | Tehlike anında iyi tepkiler verebilirim. | 1 | 2 | 3 | 4 | 5 |
| **7** | Araç kullanırken sürekli dikkat ederim. | 1 | 2 | 3 | 4 | 5 |
| **8** | Tehlikeli olduğunu düşündüğüm halde seyir halindeyken telefona cevap verir veya gelen mesajlara bakarım. | 1 | 2 | 3 | 4 | 5 |
| **9** | Otoyolda giderken dalgınlıktan yanlış gişeye girebilirim. | 1 | 2 | 3 | 4 | 5 |
| **10** | Araç kullanırken genel kurallara uymayanlara veya çok yavaş gidenlere aşırı sinirlenirim. | 1 | 2 | 3 | 4 | 5 |
| **11** | Araç kullanmaya başlamadan önce emniyet kemerini takarım. | 1 | 2 | 3 | 4 | 5 |

| | | **Beni hiçbir şekilde yansıtmıyor** | **Genel olarak beni yansıtmıyor** | **Beni ne yansıtıyor ne yansıtmıyor** | **Genel olarak beni yansıtıyor** | **Beni tamamen yansıtıyor** |
|---|---|---|---|---|---|---|
| **12** | Aracımın icinden bazı durumlarda diğer araç sürücülerine küfreder veya el-kol hareketi yaparım. | 1 | 2 | 3 | 4 | 5 |
| **13** | Hava şartlarına dikkat ederek araç kullanırım. | 1 | 2 | 3 | 4 | 5 |
| **14** | Hiç acelem olmasa bile araç kullanırken sabırsız davranırım. | 1 | 2 | 3 | 4 | 5 |
| **15** | Önüme aniden birşey çıktığında fren yapmadan önce hemen dikiz aynasından arkayı kontrol ederim. | 1 | 2 | 3 | 4 | 5 |
| **16** | Bir şeye/yere **gecikiyor olmasam** da araç kullanırken aceleci davranırım. | 1 | 2 | 3 | 4 | 5 |
| **17** | Tehlike anında seri hareketler yapabilirim. | 1 | 2 | 3 | 4 | 5 |
| **18** | Bazı durumlarda diğer sürücülere bağırırım. | 1 | 2 | 3 | 4 | 5 |
| **19** | Birşeyle burun buruna gelince sağa-sola hiç bakmadan direksiyonu kırarım. | 1 | 2 | 3 | 4 | 5 |
| **20** | Acelem olmadığı halde önümdeki araç yavaşsa onu geçmekten kendimi alamam. | 1 | 2 | 3 | 4 | 5 |
| **21** | Araç kullanırken müziğe eşlik edip dikkatim dağılabilir. | 1 | 2 | 3 | 4 | 5 |
| **22** | Dar yollarda hız yapmam. | 1 | 2 | 3 | 4 | 5 |
| **23** | Araç kullanırken karşı tarafın ne yapacağını sürekli hesap ederim. | 1 | 2 | 3 | 4 | 5 |
| **24** | Tehlikeli olduğunu düşündüğüm halde, kırmızı ışığın yanmasına çok az zaman varsa ışıkta kalmamak için gaza basarım. | 1 | 2 | 3 | 4 | 5 |
| **25** | Kaza olabilecek bir durumda kurtarabilmek için en boş yer neresi çok hızlı görüp oraya kaçarım. | 1 | 2 | 3 | 4 | 5 |
| **26** | Araç kullanırken sürekli sağa-sola ve arkaya-öne bakarak etrafı kontrol ederim. | 1 | 2 | 3 | 4 | 5 |

| | | **Beni hiçbir şekilde yansıtmıyor** | **Genel olarak beni yansıtmıyor** | **Beni ne yansıtıyor ne yansıtmıyor** | **Genel olarak beni yansıtıyor** | **Beni tamamen yansıtıyor** |
|---|---|---|---|---|---|---|
| **27** | Duracağım veya yavaşlayacağım zaman arkadan gelen aracın yeterli fren mesafesi olup olmadığını kontrol ederim. | 1 | 2 | 3 | 4 | 5 |
| **28** | Araç kullanırken güvenlik zaafiyeti oluşturabilecek davranışlardan kaçınırım. | 1 | 2 | 3 | 4 | 5 |
| **29** | Tehlike anında sağa sola hizlica bakıp kontrol ederek manevra yaparım. | 1 | 2 | 3 | 4 | 5 |
| **30** | Trafik işaretleri degişmiş olsa bile dikkatsizlikten eski kural neyse onu uyguladığım olur. | 1 | 2 | 3 | 4 | 5 |
| **31** | Bazı durumlarda aracımdan inip diğer araç sürücüleri veya yayalarla tartışırım. | 1 | 2 | 3 | 4 | 5 |
| **32** | Gereksiz olduğunu düşündüğüm durumlarda bile korna çalarım. | 1 | 2 | 3 | 4 | 5 |
| **33** | Işıklara yaklaşırken yavaşlarım. | 1 | 2 | 3 | 4 | 5 |
| **34** | Tehlike anında panik yapmam. | 1 | 2 | 3 | 4 | 5 |
| **35** | Herşeyi düşünerek, önceden planlayarak araç kullanırım (örneğin kavşakta sağa döneceksem kavşağa 200 m kala sağ şeride geçerim). | 1 | 2 | 3 | 4 | 5 |
| **36** | Tehlike anında hızlı karar verebilirim. | 1 | 2 | 3 | 4 | 5 |
| **37** | Araç kullanırken zihnim başka şeylerle meşguldur. | 1 | 2 | 3 | 4 | 5 |
| **38** | Araç kullanırken yola bakmak yerine çevredeki insanlara veya reklam panolarına bakarım. | 1 | 2 | 3 | 4 | 5 |
| **39** | Araç kullanırken dalıp o an gitmek istediğim yere değil de normalde sürekli gittiğim yere gittiğim olur. | 1 | 2 | 3 | 4 | 5 |
| **40** | Araç kullanırken tehlike anında dalgınlık nedeniyle boş bulunablirim. | 1 | 2 | 3 | 4 | 5 |
| **41** | Tehlike anında hızımı ve yolun durumunu hızlıca gözden geçirip uygunsa manevra yaparım. | 1 | 2 | 3 | 4 | 5 |

| | | Beni hiçbir şekilde yansıtmıyor | Genel olarak beni yansıtmıyor | Beni ne yansıtıyor ne yansıtmıyor | Genel olarak beni yansıtıyor | Beni tamamen yansıtıyor |
|---|---|---|---|---|---|---|
| **42** | Trafikte akış esnasında durunca el frenini çekmeyi unutabilirim. | 1 | 2 | 3 | 4 | 5 |
| **43** | Acelem olmasa da ışıklarda arabayı hızlı kaldırmaktan kendimi alamam. | 1 | 2 | 3 | 4 | 5 |
| **44** | Trafikte aniden durmam gereken bir şey olursa durmadan önce hızla etrafı kontrol edebilirim. | 1 | 2 | 3 | 4 | 5 |
| **45** | Temkinli araç kullanırım. | 1 | 2 | 3 | 4 | 5 |
| **46** | Tehlike aninda hızlıca aynaları kontrol ederek hemen şerit değiştiririm. | 1 | 2 | 3 | 4 | 5 |
| **47** | Tehlike anında yavaşlarken bir yandan da hızlıca çevreyi kontrol ederek kaçacak güvenli bir yer bulmaya calışırım. | 1 | 2 | 3 | 4 | 5 |
| **48** | Yolun ilerisindeki bir sıkışma durumunu fark edip hemen dörtlüleri yakarak arkadan gelen araçların yavaşlamasını sağlarım. | 1 | 2 | 3 | 4 | 5 |
| **49** | Önüme kıran bir araca çarpmamak için hızlanırım. | 1 | 2 | 3 | 4 | 5 |

**<u>ARAÇ KULLANAN BİR SÜRÜCÜ OLARAK</u>** kendinizi düşündüğünüzde aşağıda verilen sıfatların sizi ne kadar yansıttığını değerlendiriniz. Bu değerlendirme için aşağıdaki 5`li ölçek üzerinde en uygun olduğunu düşündüğünüz rakamı işaretleyiniz. Samimi paylaşımınız için teşekkür ederiz.

Bu ölçekte;

**1: Beni hiçbir şekilde yansıtmıyor**
**2: Genel olarak beni yansıtmıyor**
**3: Beni ne yansıtıyor ne de yansıtmıyor**
**4: Genel olarak beni yansıtıyor**
**5: Beni tamamen yansıtıyor**

olarak tanımlanmıştır.

| | **Beni hiçbir şekilde yansıtmıyor** | **Genel olarak beni yansıtmıyor** | **Beni ne yansıtıyor ne yansıtmıyor** | **Genel olarak beni yansıtıyor** | **Beni tamamen yansıtıyor** |
|---|---|---|---|---|---|
| Sabırsız | 1 | 2 | 3 | 4 | 5 |
| Sinirli | 1 | 2 | 3 | 4 | 5 |
| Agresif/Saldırgan | 1 | 2 | 3 | 4 | 5 |
| Stresli | 1 | 2 | 3 | 4 | 5 |
| Gergin | 1 | 2 | 3 | 4 | 5 |
| Tahammülsüz | 1 | 2 | 3 | 4 | 5 |
| Aceleci | 1 | 2 | 3 | 4 | 5 |
| Bilinçsiz | 1 | 2 | 3 | 4 | 5 |
| Bencil | 1 | 2 | 3 | 4 | 5 |
| Duyarsız | 1 | 2 | 3 | 4 | 5 |
| Kendini kontrol edemeyen | 1 | 2 | 3 | 4 | 5 |
| Dürtüsel | 1 | 2 | 3 | 4 | 5 |
| Tepkisel | 1 | 2 | 3 | 4 | 5 |
| Umursamaz | 1 | 2 | 3 | 4 | 5 |
| Sorumsuz | 1 | 2 | 3 | 4 | 5 |
| Düşüncesiz | 1 | 2 | 3 | 4 | 5 |
| Temkinsiz | 1 | 2 | 3 | 4 | 5 |
| Vurdumduymaz | 1 | 2 | 3 | 4 | 5 |
| Gamsız | 1 | 2 | 3 | 4 | 5 |
| Garantici | 1 | 2 | 3 | 4 | 5 |
| Deneyimli | 1 | 2 | 3 | 4 | 5 |

| | **Beni hiçbir şekilde yansıtmıyor** | **Genel olarak beni yansıtmıyor** | **Beni ne yansıtıyor ne yansıtmıyor** | **Genel olarak beni yansıtıyor** | **Beni tamamen yansıtıyor** |
|---|---|---|---|---|---|
| Panik | 1 | 2 | 3 | 4 | 5 |
| Acemi | 1 | 2 | 3 | 4 | 5 |
| Heyecanlı | 1 | 2 | 3 | 4 | 5 |
| Refleksleri kuvvetli | 1 | 2 | 3 | 4 | 5 |
| Soğukkanlı | 1 | 2 | 3 | 4 | 5 |
| Tezcanlı | 1 | 2 | 3 | 4 | 5 |
| Tetikte | 1 | 2 | 3 | 4 | 5 |
| Zeki | 1 | 2 | 3 | 4 | 5 |
| Becerikli | 1 | 2 | 3 | 4 | 5 |
| El-kol-ayak koordinasyonu güçlü olan | 1 | 2 | 3 | 4 | 5 |
| Bilişsel kapasitesi yüksek olan | 1 | 2 | 3 | 4 | 5 |
| Algısı yüksek olan | 1 | 2 | 3 | 4 | 5 |
| Telaşlı | 1 | 2 | 3 | 4 | 5 |
| Hazırcevap | 1 | 2 | 3 | 4 | 5 |
| Kafası hızlı çalışan | 1 | 2 | 3 | 4 | 5 |
| Hareketli | 1 | 2 | 3 | 4 | 5 |
| Dikkatsiz | 1 | 2 | 3 | 4 | 5 |
| Zihni meşgul | 1 | 2 | 3 | 4 | 5 |
| Dalgın | 1 | 2 | 3 | 4 | 5 |

**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 |

**Araç kullanırken güçlü ve zayıf yönleriniz nelerdir?**

Doğal olarak, hepimizin güçlü ve zayıf sürücü yönlerimiz vardır. Lütfen sizin, bir sürücü olarak güçlü ve zayıf yönlerinizin neler olduğunu her bir madde için aşağıdaki uygun seçeneği işaretleyerek belirtiniz

**0= ÇOK ZAYIF**
**1= ZAYIF**
**2= NE ZAYIF NE GÜÇLÜ**
**3=GÜÇLÜ**
**4= ÇOK GÜÇLÜ**

| | | Çok zayıf | Zayıf | Ne zayıf ne güçlü | Güçlü | Çok güçlü |
|---|---|---|---|---|---|---|
| **1** | Seri araç kullanma | 0 | 1 | 2 | 3 | 4 |
| **2** | Trafikte tehlikeleri görme | 0 | 1 | 2 | 3 | 4 |
| **3** | Sabırsızlanmadan yavaş bir aracın arkasından sürme | 0 | 1 | 2 | 3 | 4 |
| **4** | Kaygan yolda araç kullanma | 0 | 1 | 2 | 3 | 4 |
| **5** | İlerideki trafik durumlarını önceden kestirme | 0 | 1 | 2 | 3 | 4 |
| **6** | Belirli trafik ortamlarında nasıl hareket edileceğini bilme | 0 | 1 | 2 | 3 | 4 |
| **7** | Yoğun trafikte sürekli şerit değiştirme | 0 | 1 | 2 | 3 | 4 |
| **8** | Hızlı karar alma | 0 | 1 | 2 | 3 | 4 |
| **9** | Sinir bozucu durumlarda sakin davranma | 0 | 1 | 2 | 3 | 4 |
| **10** | Aracı kontrol etme | 0 | 1 | 2 | 3 | 4 |
| **11** | Yeterli takip mesafesi bırakma | 0 | 1 | 2 | 3 | 4 |
| **12** | Koşullara göre hızı ayarlama | 0 | 1 | 2 | 3 | 4 |
| **13** | Geriye kaçırmadan aracı yokuşta kaldırma | 0 | 1 | 2 | 3 | 4 |
| **14** | Sollama | 0 | 1 | 2 | 3 | 4 |
| **15** | Gerektiğinde kazadan kaçınmak için yol hakkından vazgeçme | 0 | 1 | 2 | 3 | 4 |
| **16** | Hız sınırlarına uyma | 0 | 1 | 2 | 3 | 4 |
| **17** | Gereksiz risklerden kaçınma | 0 | 1 | 2 | 3 | 4 |
| **18** | Diğer sürücülerin hatalarını telafi edebilme | 0 | 1 | 2 | 3 | 4 |
| **19** | Trafik ışıklarına dikkatle uyma | 0 | 1 | 2 | 3 | 4 |
| **20** | Dar bir yere geri geri park edebilme | 0 | 1 | 2 | 3 | 4 |

İnsanlar farklı durumlarda gösterdikleri düşünce ve davranışları ile birbirlerinden ayrılırlar. Aşağıdaki cümlelerde bazı durumlarda nasıl düşündüğünüzü ve davrandığınızı ölçen ifadeler bulunmaktadır. Lütfen her bir cümleyi okuyunuz ve sağındaki, size en uygun olan rakamı işaretleyiniz. Cümlelerin doğru ya da yanlış cevabı yoktur, önemli olan sizin ne yaptığınız veya düşündüğünüzdür. Cevaplamak için çok zaman ayırmayınız. Hızlı ve dürüstçe cevap veriniz.

| | | **Bana hiç uymuyor** | | | **Bana çok uyuyor** |
|---|---|---|---|---|---|
| **1** | Ne giyeceğim ya da akşam yemeğinde ne yiyeceğim gibi basit seçimlerde bile aceleyle karar vermeyi sevmem. | 1 | 2 | 3 | 4 |
| **2** | Çoğu zaman aklıma geleni düşünmeden söylerim. | 1 | 2 | 3 | 4 |
| **3** | Derhal birşey yapmak zorunda olduğunuz yoksa şansınızı kaybedeceğiniz anlık fırsatlardan yararlanmakta iyiyimdir. | 1 | 2 | 3 | 4 |
| **4** | Sorunları/problemleri sakin sakin ve dikkatli bir şekilde çözmekten keyif alırım. | 1 | 2 | 3 | 4 |
| **5** | Çoğu zaman düşüncelerimi kelimelere çok hızlı bir şekilde dökebilirim. | 1 | 2 | 3 | 4 |
| **6** | Çoğu zaman müsait olup olmadigimi düşünmeden randevular veririm. | 1 | 2 | 3 | 4 |
| **7** | Hızlı bir şekilde karar vermek zorunda olduğum zaman rahat edemem. | 1 | 2 | 3 | 4 |
| **8** | Çoğu zaman alım gücümün gerçekten yetip yetmeyeceğini düşünmeden bir şeyler satın alırım. | 1 | 2 | 3 | 4 |
| **9** | Konuşmadan önce düşünmek için çok fazla zamanın olmadığı hakikaten hızlı gelişen diyaloglarda bulunmayı severim. | 1 | 2 | 3 | 4 |
| **10** | Çoğu zaman bir durumu bütün yönleriyle değerlendirmeye vakit ayırmadan karar veririm. | 1 | 2 | 3 | 4 |
| **11** | Çok zor olmayan bir şey yapıyor olsam dahi bir şeyleri hızlı yapmayı sevmem. | 1 | 2 | 3 | 4 |
| **12** | Çoğu zaman harekete geçmeden önce düşünüp taşınmak için yeterince zaman ayırmam. | 1 | 2 | 3 | 4 |
| **13** | Çok fazla anlık karar vermemi gerektiren bir işte çalışmaktan keyif alırdım. | 1 | 2 | 3 | 4 |
| **14** | Düşünmeden hareket ettiğim için çoğu zaman başımı derde sokarim. | 1 | 2 | 3 | 4 |
| **15** | Bir sonraki hamlenizi çabucak belirlemenizi gerektiren spor ve oyunlari severim. | 1 | 2 | 3 | 4 |
| **16** | Öncesinde dikkatli bir şekilde düşünüp taşınmadığım için çoğu kez yaptığım planlar sonuca ulaşmaz. | 1 | 2 | 3 | 4 |

| | | **Bana hiç uymuyor** | | | **Bana çok uyuyor** |
|---|---|---|---|---|---|
| **17** | Yeterince hızlı karar veremediğim için fırsatları kaçırdığım çok olmuştur. | 1 | 2 | 3 | 4 |
| **18** | Hızlı düşünebildiğim için insanlar bana hayran kalır. | 1 | 2 | 3 | 4 |
| **19** | Öncelikle olası sorunlarını değerlendirmeden projelerde nadiren yer alırım. | 1 | 2 | 3 | 4 |
| **20** | Harekete geçmeden önce düşümek icin çok zamanınızın olmadığı aktivitelerden kaçınmaya calışırım. | 1 | 2 | 3 | 4 |
| **21** | Önemli bir karar vermeden önce artılarını ve eksilerini dikkatli bir sekilde tartarım. | 1 | 2 | 3 | 4 |
| **22** | Dikkatli bir şekilde akıl yürütmek konusunda iyiyimdir. | 1 | 2 | 3 | 4 |
| **23** | Çoğu zaman sonuçlarını düşünmeden bir şeyler söyler ve yaparım. | 1 | 2 | 3 | 4 |

İnsanlar farklı durumlarda gösterdikleri düşünce ve davranışları ile birbirlerinden ayrılırlar. Aşağıdaki cümlelerde bazı durumlarda nasıl düşündüğünüzü ve davrandığınızı ölçen ifadeler bulunmaktadır. Lütfen her bir cümleyi okuyunuz ve sağındaki, size en uygun olan rakamı işaretleyiniz. Cümlelerin doğru ya da yanlış cevabı yoktur, önemli olan sizin ne yaptığınız veya düşündüğünüzdür. Cevaplamak için çok zaman ayırmayınız. Hızlı ve dürüstçe cevap veriniz.

| | | **Bana hiç uymuyor** | | | **Bana çok uyuyor** |
|---|---|---|---|---|---|
| **1** | Yüksek bir dağın tepesinden aşağıya hızla kayarken hissedilen duygular bana keyif verebilir. | 1 | 2 | 3 | 4 |
| **2** | Dürtülerimi kontrol etmede sorun yaşarım. | 1 | 2 | 3 | 4 |
| **3** | İhtiyatlı ve tedbirli biriyimdir. | 1 | 2 | 3 | 4 |
| **4** | Bir şey yapmaya başladığımda, durmaktan nefret ederim. | 1 | 2 | 3 | 4 |
| **5** | Kendimi çoğu kez, sonradan pişman olup da kurtulmak istediğim işlerin içine sokarım. | 1 | 2 | 3 | 4 |
| **6** | Genellikle olayları sonuna kadar takip etmeyi severim. | 1 | 2 | 3 | 4 |
| **7** | Kendimi kötü hissettiğim bazı zamanlarda, kendimi kötü hissettirse bile yapmakta olduğum şeyi durduramam. | 1 | 2 | 3 | 4 |
| **8** | Üzgün olduğum zamanlarda çoğu kez düşünmeden hareket ederim. | 1 | 2 | 3 | 4 |
| **9** | Yapılması gereken küçük işleri bazen hiç umursamam. | 1 | 2 | 3 | 4 |
| **10** | Karşılaştığım sorunları mantıklı bir biçimde değerlendirerek "makul" bir yaklaşımda bulunma eğilimindeyim. | 1 | 2 | 3 | 4 |
| **11** | Duygularıma göre hareket etmemin önüne geçemiyorum. | 1 | 2 | 3 | 4 |
| **12** | Herhangi bir şey yapmadan önce genellikle iyice düşünürüm. | 1 | 2 | 3 | 4 |
| **13** | Sorunlarla karşılaştığımda onları çoğu kez içinden çıkılmaz bir hale getiririm çünkü üzgün olduğum zamanlarda düşünmeden hareket ederim. | 1 | 2 | 3 | 4 |
| **14** | Bu hayatta her şeyi bir kere deneyeceğim. | 1 | 2 | 3 | 4 |
| **15** | Bir tartışmanın en ateşli anında, çoğu kez sonradan pişman olduğum sözler söylerim. | 1 | 2 | 3 | 4 |

| | | Bana hiç uymuyor | | | Bana çok uyuyor |
|---|---|---|---|---|---|
| **16** | Duygularımı her zaman kontrol altında tutmayı başarabilirim. | 1 | 2 | 3 | 4 |
| **17** | Arabayı hızlı sürmek hoşuma gidebilir. | 1 | 2 | 3 | 4 |
| **18** | Bazen aklıma eseni yapar ve sonra pişman olurum. | 1 | 2 | 3 | 4 |
| **19** | Kararlarımı genellikle dikkatlice enine boyuna düşünerek veririm. | 1 | 2 | 3 | 4 |
| **20** | Düşünmeden konuşan biri değilim. | 1 | 2 | 3 | 4 |
| **21** | Harekete geçmeden önce biraz durup yapacağım şey üzerine düşünürüm. | 1 | 2 | 3 | 4 |
| **22** | Ara sıra biraz korkutucu işler yapmaktan keyif alırım. | 1 | 2 | 3 | 4 |
| **23** | Kendimi kötü hissettiğimde, çoğu kez o anda iyi hissettiren fakat sonradan yaptığıma pişman olduğum şeyler yaparım. | 1 | 2 | 3 | 4 |
| **24** | Nasıl yürüteceğimi tam olarak bilmediğim bir projeye başlamak istemem. | 1 | 2 | 3 | 4 |
| **25** | Paraşütle atlamak hoşuma gidebilir. | 1 | 2 | 3 | 4 |
| **26** | Bitmemiş, yarım kalan işler canımı sıkar. | 1 | 2 | 3 | 4 |
| **27** | İhtiyatlı biriyimdir. | 1 | 2 | 3 | 4 |
| **28** | Risk almaktan hoşlanırım. | 1 | 2 | 3 | 4 |
| **29** | Yeni bir durumun içine girmeden önce, o durumun bana neler kazandırabileceğini bilmek isterim. | 1 | 2 | 3 | 4 |
| **30** | Bir sonraki hamlenin çabuk yapıldığı spor ve oyunlardan hoşlanırım. | 1 | 2 | 3 | 4 |
| **31** | Bir konuyla ilgili karar vermeden önce tüm avantaj ve dezavantajları hesaba katarım. | 1 | 2 | 3 | 4 |
| **32** | Reddedildiğimi hissettiğim zamanlarda, çoğu kez sonradan pişman olduğum şeyler söylerim. | 1 | 2 | 3 | 4 |
| **33** | Şiddetli isteklerime direnç göstermede sorun yaşarım. (örneğin, yemek, sigara içmek vb.) | 1 | 2 | 3 | 4 |
| **34** | Su kayağı yapmaktan keyif alabilirim. | 1 | 2 | 3 | 4 |
| **35** | Kolayca pes etme eğiliminde olan biriyim. | 1 | 2 | 3 | 4 |
| **36** | Biraz korkutucu ya da gelenekdışı dahi olsalar, yeni deneyimler ve duygular yaşamaya açığımdır. | 1 | 2 | 3 | 4 |
| **37** | Kolaylıkla konsantre olabilirim. | 1 | 2 | 3 | 4 |
| **38** | Başladığım işi bitiririm. | 1 | 2 | 3 | 4 |
| **39** | İşleri zamanında bitirebilmek için belirli bir düzen içinde çalışma konusunda oldukça iyiyimdir. | 1 | 2 | 3 | 4 |

| | | Bana hiç uymuyor | | | Bana çok uyuyor |
|---|---|---|---|---|---|
| **40** | Ben her zaman yapacak bir işi olan üretken biriyim. | 1 | 2 | 3 | 4 |
| **41** | Hava tüpü olmadan dalış yapmak hoşuma gidebilir. | 1 | 2 | 3 | 4 |
| **42** | Başladığım hemen hemen her işin sonunu getiririm. | 1 | 2 | 3 | 4 |
| **43** | Düşüncelerim ölçülü ve bir amaca yöneliktir. | 1 | 2 | 3 | 4 |
| **44** | Uçak kullanmayı öğrenmek hoşuma gidebilir. | 1 | 2 | 3 | 4 |
| **45** | Genellikle yeni ve heyecan verici deneyimler ve duygular ararım. | 1 | 2 | 3 | 4 |

## Appendix B: Curriculum Vitae

**PINAR BIÇAKSIZ**

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**Personal Info:**

Birth Date, Place: 02.10.1984, Seyhan/ADANA

Nationality: T.R.

**Education:**

**PhD:** Middle East Technical University, Department of Psychology, Social Psychology (September 2009 – September 2015)

CGPA: 3.93/4.00

**February 2011- July 2011** – Birkbeck College, University of London, PhD Student, Supervisor: Prof. Dr. Rob Briner

**2011 Spring Term** – Online Course: "Using Summary Measures to Improve Public Health", Johns Hopkins University Bloomberg School of Public Health

**2011 Fall Term** – Online Course: "Confronting the Burden of Injuries: A Global Perspective", Johns Hopkins University Bloomberg School of Public Health

**Master's Degree:** Middle East Technical University, Department of Psychology, Industrial/Organizational Psychology (September 2006 – September 2009)

CGPA: 3.86/4.00

**Undergraduate:** Middle East Technical University, Department of Psychology (September 2002 – September 2006)

CGPA: 3.61/4.00

**High School:** Adana Kurttepe Anadolu Lisesi

GPA: 4.49/5.00

**Representative Work:**

**Journal Publications:**

**Bıçaksız, P**., & Özkan, T. (in press). Impulsivity and driver behaviors, offences and accident involvement: A systematic review. Transportation *Research Part F: Psychology and Behaviour.*

Doğruyol, B., Özkan, T., Hoe, C. H., Gupta, S., **Bıçaksız, P.**, Puvanachandra, P., Lajunen, T., & Hyder, A. A. (under review). Factors Associated with over Speeding in Traffic. *Traffic Injury Prevention.*

Matta, F. K., Erol-Korkmaz, H. T., Johnson, R. E., & **Bıçaksız, P**. (2014). Significant work events and counterproductive work behavior: The role of fairness, emotions, and emotion regulation. *Journal of Organizational Behavior, 35*, 920-944. DOI: 10.1002/job.1934

**Reports:**

Özkan, T., Üzümcüoğlu, Y., Öztürk, İ., Öz, C., Fındık, G., Serin, G., Uslu, İ., **Bıçaksız, P.,** ..., Yaylacı, O. (2015). Türkiye Analizi: Takip Çalışması Sürücü ve Ön Koltuk Yolcularının Emniyet Kemeri Kullanımı. Emniyet Genel Müdürlüğü (http://www.trafik.gov.tr/SiteAssets/Yayinlar/Kitaplar/Emniyet_Kemeri_2015.pdf)

Özkan, T., Öztürk, İ**.,** Üzümcüoğlu, Y., **Bıçaksız, P.,** … Kurban, S. (2015). Trafik Kurul Kararlarının Analizi – Türkiye Değerlendirmesi. Emniyet Genel Müdürlüğü.

**Oral Presentations:**

**Bıçaksız, P**., Gündoğdu Aktürk, E. & Öner-Özkan, B. (July, 2015). The relationship between basic personality traits, attachment and time perspective orientation in a Turkish sample. 14th European Congress of Psychology (ECP 2015), Milan, Italy.

Gündoğdu Aktürk, E., Çenesiz, G. Z., Akbaş, G., & **Bıçaksız, P.**, (May, 2015). When sexism steps in little minds? Gender roles in relation to toy selection. Paper published in the proceedings of International Play and Toy Congress, Erzurum, Turkey.

Doğruyol, B., **Bıçaksız, P**, Puvanachandra, P., Özkan, T., Hoe, C. H., Lajunen, T., Hyder, A. (May, 2012). Neden Hız Yaparız? (Why do we exceed speed limits? – First wave results) Road Traffic Safety Symposium 2012, Ankara, Turkey.

**Bıçaksız, P.**, & Sümer, C. (July, 2011). Moderating role of core self-evaluations in the relationship between work demands and work-family interface. 12th European Congress of Psychology (ECP 2011), İstanbul, Turkey.

**Poster Presentations:**

Hoe, C, **Bıçaksız, P**., Puvanachandra, P., Özkan, T, Lajunen, T, Hyder, A. A. (2012). Making global road safety collaborations work: stakeholders' perceptions. Injury Prevention, 18: A208, doi:10.1136/injuryprev-2012-040590u.15

**Panel:**

Bilgiç, R., & **Bıçaksız, P.** (September, 2010). Psikolojik Dayanıklılığın Psikolojik Sağlık, Stress, İş Doyumu, Örgütsel Bağlılık ve İşe Bağlılıkla İlişkisi: Bir Meta-Analiz Çalışması (Relationship between hardiness and psychological health, stress, job satisfaction,

organizational commitment, and job commitment: A meta-analysis study). 4th National Psychology Graduate Students Congress, Ankara, Turkey.

## Appendix C: Turkish Summary

# GİRİŞ

Dürtüsellik, psikoloji literatüründeki kişilik modellerinin neredeyse hepsinde yer alan en önemli kavramlardan biridir (Whiteside & Lynam, 2001). Bu kavram üzerine birçok araştırma yapılmıştır, ancak hala ilgili literatürde bu kavramın tanımıyla ilgili farklılaşmalar bulunmaktadır (Evenden, 1999). Buna rağmen, genel olarak davranışların sonuçları üzerinde düşünüp taşınmadan ve değerlendirme yapmadan hareket etme eğilimi olarak tanımlanabilir (Caci, Nadalet, Baylé, Robert & Boyer, 2003, s. 34). Ayrıca, dürtüselliğin bileşenleri ve faktör yapısı konusunda da ilgili literatürde farklı görüşler yer almaktadır ve tek faktörlü mü yoksa birden çok boyut, karakter özelliği ya da davranış örüntüsünden mi meydana geldiği konusunda değişik görüşler vardır (Evenden, 1999). Örnek olarak, "beklemeyi becerememe", tepkileri kısıtlamada zorlanma, olumsuz veya geciken sonuçlara duyarsız olma gibi birçok değişik uyumsuz davranış için "dürtüsellik" teriminin kullanıldığı söylenebilir (de Wit, 2009). Dürtüselliğin altında yatan süreçlerden en yaygın bir şekilde belirlenmiş olanları davranışı bastırma ve bozulmuş karar verme mekanizmasıdır (de Wit, 2009). Ama en genel haliyle dürtüsellik hazzı ertelemeyi becerememe ya da öz-denetimin tersi olarak tanımlanabilir (Monterosso & Ainslie, 1999).

Dürtüselliğin farklı tanımlarının belirli ölçüde farklı teorik perspektiflerin yansımaları olduğu görülebilir. En genel anlamda dürtüselliğin üç genel perspektif çerçevesinde çalışıldığı söylenebilir; bunlar bilişsel, davranışsal ve karakterolojik perspektifler olarak sıralanabilir (Arce & Santisteban, 2006). Bilişsel perspektifte dürtüsellik anlık ve gelecekteki olayların sonuçlarını göz önünde bulundurma yetersizliği, ve bu yüzden de hazzı erteleyememe olarak tanımlanır. Davranışsal (ya da diğer adıyla motor) dürtüsellik ise daha çok davranışın bastırılması ile ilişkilidir ve birtakım deneysel yöntemler kullanılarak ölçülür. Bu çalışmanın da odağında olan

karakterolojik perspektifte dürtüsellik ise daha çok farklı kişilik modellerinin temel alınarak hazırlandığı öz-beyana dayalı ölçeklerle ölçülür.

Karakterolojik perspektifte dürtüselliğin en eski tanımlamalarından birine Buss ve Plomin'in (1975) üç boyuttan oluşan "baskılama kontrolü" (inhibitory control) örnek gösterilebilir. Bu üç boyut "karar süresi" (bir karar vermeden önce sonuçları ve alternatifleri göz önünde bulundurma eğilimi), "sebatlılık" (persistence; bir işe başlandığında sonuna kadar devam edebilme becerisi) ve "heyecan arama" (sensation seeking; çabuk sıkılma ve değişik uyaranlar arama eğilimi) olarak önerilmiştir. Dürtüselliği bir kişilik değişkeni olarak ele alan başka bir model ise Eysenck'in biyolojik modelidir (Eysenck & Eysenck, 1985). Bu modelde dürtüselliğin daraltılmış dürtüsellik (narrow impulsivity), plansızlık, hareketlilik ve risk alma davranışlarının kombinasyonu olduğu öne sürülmüştür.

Eysenck'in biyolojik modeline dayanan başka biyolojik modeler de öne sürülmüştür; bunlar Gray'in (1987), Cloninger'in (1987) ve Zuckerman'ın (1984) modelleridir (Acton, 2003; Arce & Santisteban, 2006). İlk olarak, Gray'in nöropsikolojik temelli modelidir. Bu modelde dürtüsellik, Eysenck'in dışadönüklük değişkeni ile çok yakından ilişkili olan davranışsal yaklaşma sistemine dayandırılmıştır (Acton, 2003). Dürtüsel tepki verme davranışını Gray'in bu nöropsikolojik modeline dayanarak aaçıklama çabasıyla Newman ve arkadaşları üç ayrı yol önermişlerdir. Bunlardan ilki "normal dürtüsellik" olup davranışsal yaklaşma sisteminin davranışsal bastırma sistemini domine etmesi üzerine ödüle fazla duyarlılık olarak sonuçlanır. İkincisi "kaygılı dürtüsellik" olup davranışsal bastırma sisteminin davranışsal yaklaşma sistemini domine etmesi sonucu oluşur. Üçüncü yol ise "eksik psikopatik-kısıtlama" olup ödül arama sürecinde çevreden gelen geribildirimi almada ve gelen bilgileri uygun tepkileri ayarlamak için kullanmada zorlanma olarak açıklanmıştır (Newman & Wallace, 1993; Wallace, Newman & Bachorowski, 1991).

Eysenck'in biyolojik modeline dayanan bir başka biyolojik model ise Cloninger'in üç boyutlu kişilik modelidir (1987). Bu modele göre kişiliğin genetik olarak birbirinden bağımsız üç boyutu vardır. Bunlar zarardan kaçınma, ödüle bağımlılık ve yenilik arayışıdır. Birçok kişilik özelliği bu üç boyutun farklı kombinasyonlarından oluşmaktadır ve dürtüsellik yüksek seviyede yenilik arayışının

görece düşük seviyede ödüle bağımlılık ve yine düşük seviyede zarardan kaçınma kombinasyonu ile tanımlanmaktadır.

Bu bağlamda son olarak Zuckerman ve arkadaşlarının (Zuckerman, Kuhlman & Camac, 1988) kişiliği açıklamak üzere sundukları genel bir çerçevenin dürtüselliği de kapsadığından bahsedilebilir. Zuckerman ve arkadaşları (Zuckerman ve ark., 1988) heyecan arama ve dürtüsellik değişkenlerini ölçmede kullanılan birçok farklı ölçeğin maddeleri üzerinde yaptıkları faktör analizleri sonucunda Zuckerman–Kuhlman Kişilik Envanterini (Zuckerman–Kuhlman Personality Questionnaire; ZKPQ- IIIR) geliştirmişlerdir. Dürtüsel-heyecan arama bu beş faktörden biri olup düşünmeden ve plan yapmadan hareket etme eğilimini yansıtır.

İlgili literatürde dürtüselliğin ele alındığı üç akım olarak sayılabilecek bilişsel, davranışsal ve karakterolojik perspektifleri birleştirici bir perspektif olarak ele alınabilecek olan Barratt ve arkadaşların (Barratt, 1993; Gerbing, Ahadi & Patton, 1987; Patton, Stanford &Barratt, 1995; Stanford & Barratt, 1992) öz-beyana dayalı envanterler, bilişsel ve Davranışsal deneysel ölçümler, hayvanlar üzerinde yapılan beyin-davranış araştırmaları gibi birçok değişik türde ölçümler kullanılarak elde edilen araştırma bulgularını birleştirerek Barrat Dürtüsellik Ölçeği'ni (Barratt Impulsıvıty Scale; BIS) geliştirmişlerdir. Bu ölçeği özellikle dürtüsellik kavramını kaygı kavramından ayırmak için geliştirmişlerdir. Ölçeğin farklı versiyonları üç-bileşenli bir faktör yapısına sahiptir ve bunlar "motor dürtüsellik", "bilişsel/dikkatte dürtüsellik" ve "plan yapmama" olarak sıralanabilir. Motor dürtüsellik düşünmeden hareket etme olarak tanımlanırken, bilişsel/dikkatte dürtüsellik yapmakta olunan işe konsantre olamama ve hızlı bilişsel kararlar verme olarak tanımlanmıştır. Son olarak plan yapmama ise sadece şimdiki zamana yönelim veya gelecek zaman yöneliminden yoksunluk olarak tanımlanmıştır (Patton, Stanford &Barratt, 1995).

Yukarıda bahsi geçen tanımlamaların tümünde ortak olan bir olumsuz veya uyumsuz bir çağrışım bulunmaktadır. Ancak, Dickman (1990) dürtüselliğin işlevsel ve işlevsiz olarak ayrılabileceğini öne sürmüştür. Dickman, insanların bir çeşit zorluk yaşamalarına neden olan bazı acele ve kusurlu tepkiler vermelerine yol açan faktörlerle, bu tür tepkilerin en yerinde davranış biçimi olduğu durumlarda bu şekilde acele ve kusurlu tepkiler vererek olumlu sonuçlar elde etmelerine yol açan faktörlerin aynı olup olmadığını araştırmıştır. Ona göre eğer dürtüsel davranış bu kadar patolojik

olsaydı evrimsel süreçte elenirdi ve bu sebeple tüm dürtüsel davranışlar dezavantajlı sayılmamalıdır. Ayrıca hızlı ve kusurlu performans göstermeyle ilişkili olan iki ayrı tür kişilik özelliği bulunabilir. Bunlardan biri bu davranışların en uygun davranış biçimi olduğu durumlarda sergileme diğeri ise uygun olmadığı durumlarda sergileme olarak ayrılabilir ve Dickman ilkini işlevsel dürtüsellik, ikincisini ise işlevsiz dürtüsellik olarak tanımlamıştır. Bu iki ayrı özelliği ölçmek üzere Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği'ni geliştirmiştir. Bu iki değişken arasında .07 gibi düşük bir korelasyon bularak bunların iki ayrı özellik olduğunu kanıtlamıştır (Dickman, 1990). Buna ek olarak, bu iki değişkenin genel dürtüsellik ilişkili, olduğu bilinen başka kişilik değişkenleriyle aralarındaki bağıntıların örüntülerinin farklı olduğunu bulmuştur. Örneğin hareketlilik, coşkunluk ve maceraperestlik işlevsel dürtüsellikle daha güçlü bağıntılara sahipken, düzensizlik ve karar almada önemli unsurları göz ardı etme eğilimi işlevsiz dürtüsellikle daha güçlü bağıntılar göstermiştir.

Özetle, dürtüsellik birçok uygunsuz davranışı açıklamak için yaygın olarak kullanılan değişkenklerden biridir (de Wit, 2009). Sürücülük bağlamı ise doğası gereği belki de dürtüsellik özelliğinin en çok gösterilebileceği veya deneyimlenebileceği bağlamlardan birisidir çünkü bir araç sürücüsü trafikte nasıl davranacağına büyük ölçüde kendisi karar verir. Dolayısıyla, trafik ortamı sürücüler için bu dürtüsellik özelliği gösterebilecekleri bir ortamdır. Bu nedenle de bu bağlamda dürtüselliğin çalışılması sürücü davranışlarını anlaşılması ve açıklanması adına büyük katkı yapma potansiyeline sahiptir. Bu çalışmanın amacı da ilk olarak dürtüsellik ve her tür sürücü davranışı arasındaki ilişkinin incelendiği çalışmaların sistematik bir literatür taramsını yapmak, ardından bu sentezin bulguları doğrultusunda yeni bir çerçeve önermektir.

Literatür taraması için Scopus veritabanında (www.scopus.com) "impulsivity & driver", "impulsiveness & driver", "impulsivity & driving", "impulsiveness & driving", "impulsivity & traffic", "impulsiveness & traffic", "impulsivity & accident", "impulsiveness & accident" şeklinde anahtar kelime çiftleri yayınların başlık, öz ve tüm metinlerinde, günümüze kadar tüm zamanlar seçeneği ve tüm yayın tipleri ile tüm bilim alanları seçilerek tarandı. Tek filtreleme dil için yapıldı, sadece İngilizce dilinde yapılmış olan yayınlar tarandı. Bu tarama sonucunda 288

yayına ulaşıldı. BU yayınlar içinden sistematik literatür taramasına dahil edilecek çalışmalar için kriterler şu şekilde sıralanabilir:

i) dürtüselliği bir kişilik değişkeni olarak ele almış olması (deneysel bir manipulasyonla veya bir madde ile yaratılmış bir durumsal değişken olarak değil)

ii) sürücü davranışları ile ilgili bir değişken kullanmış olması (örn.: trafik cezası sayısı, sürücü davranışlarıyla ilgili öz-beyana dayalı ölçüm sonuçları, simülatörde ölçülmüş sürücü davranışları gibi)

iii) dürtüsellik ve en az bir tane sürücü davranışlarıyla ilgili değişken arasındaki ilişkiyi incelemiş ve rapor etmiş olması

iv) yetişkin ve "normal"(nonpatient) bir örneklem kullanılmış olması (alkol bağımlılarıyla, dikkat eksikliği hiperaktivite bozukluğu olan kişilerle ve diğer psikiyatrik tanı konmuş bireylerle yapılan çalışmalar dahil edilmemiştir).

Bu kriterleri karşılayan 38 çalışma sistematik lietartür taraması kapsamında incelendi. Bu inceleme sonucunda dürtüselliğin i) olumsuz sürücü davranışları ve sürücü sinirlilik ve saldırganlığı, *ii*) madde etkisi altında araç kullanma, *iii*) trafik ceza (offences) ve kaza sayısı, *iv)* sürücü davranışlarıyla ilgili "diğer" kategorisindeki değişkenlerle (örn., simulatorle ölçümlenmiş sürücü risk alma davranışları) ilişkili olduğu gözlenmiştir. İncelenen bu 38 çalışma içerisinde, sadece dört çalışmada dürtüsellik değişkeni o çalışmada ele alınan sürücü davranışlarıyla ilgili değişkenle istatistiksel olarak anlamlı ilişki göstermemiştir. Genel olarak, dürtüsellik ve çalışmalarda incelenmiş olan sürücülük değişkeni arasındaki ilişkinin gücü öz-beyana dayalı ölçeklerle sürücülük davranışlarını ölçen çalışmalarda kaza sayısı veya trafik cezası sayısı değişkenlerinin kullanıldığı çalışmalara kıyasla daha yüksektir. Bunun trafik kaza sayısı veya trafik ceza sayısı gibi değişkenlerin doğasından kaynaklandığı öne sürülebilir, çünkü bunlar nadir görülen vakalar olduğundan varyansları düşüktür, bu nedenle de başka değişkenlerle birlikte gösterdikleri varyans, yani kovaryans, da düşük olmaktadır. Ayrıca dürtüsellik ile kaza sayısı ve ceza sayısı gibi değişkenler arasındaki ilişki aracı değişkenlerle ele alınsaydı bu çalışmalarda da anlamlı sonuçların bulunabileceği tartışılabilir. Ayrıca

bu bulgular genel bağlamsal aracılı model (general contextual mediated model) de uygunluk göstermiştir. Bu modelde kişilik değişkenlerinin uzak (distal) bağlamda olup kazaya karışma değişkenini sürücülükte insan faktörü olarak ele alınan sürücü davranışları ve becerileri üzerinden etkilediği öne sürülmektedir (Lajunen, 1997; Sümer, 2003). Dolayısıyla, bu konuda yürütülmesi planlanan çalışmalarda dürtüselliğin kaza ve ceza sayısı üzerinde sürücü davranışları ve becerileri aracılığıyla olan dolaylı etkisinin incelenmesi önerilebilir.

Ayrıca, bu model test edilirken aracı değişken olarak sadace olumsuz (aberrant) sürücü davranışlarının değil, olumlu sürücü davranışlarının göz önünde bulundurulması önerilebilir. Olumlu sürücü davranışlarını Özkan ve Lajunen (2005a) güvenlik kaygısı taşıyarak ya da taşımaksızın genel trafik ortamına ve diğer yol kullanıcılarına yardımcı olmak amacıyla yapılan davranışlar olarak tanımlamışlardır. Örneğin bir yayaya su sıçratmamak için şeritten çıkmak olumlu sürücü davranışı olarak ele alınabilir ama bu davranış bazı durumlarda küçük bir kazaya bile neden olabili. Bu tip davranışlar günlük sürüş deneyiminde yer aldığından kaza sayısını açıklamayı amaçlayan bir modelde yer alması önemlidir. .Ancak, yapılan literatür taraması göstermiştir ele alınan çalışmaların hiçbirinde dürtüselliğin olumlu sürücü davranışlarıyla ilişkisi incelenmemiştir. Bu nedenle, bahsi geçen modele olumlu sürücü davranışlarının da eklenmesi lüteratüre bu anlamda katkıda bulunacaktır.

Bir diğer önemli katkı ise Dickman (1990) tarafından literatüre kazandırılmış olan işlevsel dürtüsellik kavramının bu modele dahil edilerek işlevsel ve işlevsiz dürtüselliğin sürücü davranışları ve becerileri aracı değişkenleri üzerinden kaza ve ceza sayısına olan etkilerinin incelenmesidir. Literatür taramasında yer alan çalışmalardan sadece altı tanesi Dickman'ın işlevsel ve işlevsiz dürtüsellik kavramını kullanmış ve bu altı çalışma aynı araştırma grubu tarafından yürütülmüştür. Bu da göstermektedir ki dürtüsellik ve sürücülük değişkenlerinin incelendiği çalışmalarda dürtüselliğin işlevsel kavramsallaştırması genel olarak göz ardı edilmiştir. Ancak işlevsel dürtüsellik temel algısal süreçlerin hız ve hatasızlığı ile ilgili deneysel çalışmalarda dürtüsel işlevselliğin etkisi gözlenmiştir (Dickman, 1993) ve dikkat ve hızın araç kullanma davranışları ve becerileri ile yüksek derecede ilişkili olması beklenebilir. Bu nedenle işlevsel dürtüselliğin bu bağlamda çalışılmasının genel bağlamsal aracılı modelin açıklama gücünü artıracağı öne sürülebilir. Buna ek

olarak, literatür taraması sonucunda elde edilen bulgular işlevsel ve işlevsiz dürtüselliğin ayrı birer değişken olduğunu da destekler niteliktedir. Örneğin, Eensoo ve ark. (2004) and Eensoo ve ark. (2005) çalışmalarında madde etkisi altında araçkullanan grup ve control grubu işlevsel dürtüsellk boyutunda birbirinden anlamlı olarak farklılaşmazken, işlevsiz dürtüsellik boyutunda anlamlı olarak farklılaşmıştır. Ayrıca, Eensoo ve ark. (2010) çalışmasında işlevsel dürtüselliğin hız limitlerine uymayan grupta olma olasılığını yordadığı bulunmuştur. Bu sonuçlar da göstermektedir ki işlevsel ve işlevsiz dürtüsellik farklı sürücü davranışlarıyla ilişkilerinde farklı örüntülere sahiptir ve bu nedenle de dürtüsellik ve sürücülük değişkenleri arasındaki bağıntının incelendiği çalışmaların her iki dürtüsellik boyutunu da ele alması gerekmektedir.

Dickman'ın (1990) geliştirdiği ölçekte işlevsel dürtüsellik "Derhal birşey yapmak zorunda olduğunuz yoksa şansınızı kaybedeceğiniz anlık fırsatlardan yararlanmakta iyiyimdir", "Bir sonraki hamlenizi çabucak belirlemenizi gerektiren spor ve oyunlari severim", "Çoğu zaman düşüncelerimi kelimelere çok hızlı bir şekilde dökebilirim" gibi maddelerle ölçülmektedir ve görülmektedir ki işlevsel dürtüsellik boyutunda yüksek puanlar alan bireyler genel anlamda hızlı düşünme ve tepki verme becerilerini yüksek olarak değerlendirmektedir. Bu nedenle bu bireylerin hız yapma, yakın takip veya sol şeritte yavaş giden bir aracın sağından geçmek gibi sıradan ihlal davranışlarında bulunmaları beklenebilir çünkü bu riskli davranışlar sonucu tehlikeli bir durumla karşılaştıklarında "hızlı tepki verme" becerileri sayesinde gerekli manevraları yaparak bununla baş edebileceklerini düşünmektedirler. Ancak işlevsel dürtüselliğin saldırgan ihlallerle anlamlı ilişkisi beklenmemektedir çünkü diğer sürücülere öfkesini göstermek baskılama kontrolü (inhibitory control) ile ilgili olup işlevsel dürtüselliğin genel anlamda dürtüsel tepkileri kontrol etmede zorluk çekme ile pek de ilişkili olmadığı öne sürülmüştür (Reeve, 2007). İşlevsel dürtüselliğin, sürücü hataları ve ihmaller ile de pozitif ilişki göstermesi beklenmektedir, çünkü işlevsel dürtüsellik boyutunda yüksek puanlar alan bireylerin daha hızlı düşünüp tepki verdikleri ve durum gerektirdiğinde hızı hata pahasına tercih edebilecekleri öne sürülmüştür (Reeve, 2007). Bu eğilim araç kullanırken gidilmek istenen yere daha çabuk ulaşmak amacıyla hızlı hareket etmeye odaklanıp sürücü hataları ve ihmalleri yapmak biçiminde kendini gösterebilir. Son

olarak işlevsel dürtüsellik ve olumlu sürücü davranışları arasında negatif bir ilişki beklenmektedir, çünkü işlevsel dürtüsellik seviyesi yüksek olan bireylerin temel motivasyonunun yapmakta oldukları şeyi hızlı yapmak olduğu düşünülürse onları bu amaçlarından alıkoyacak davranışları göstermemeleri beklenmektedir. Örneğin yol hakkı kendilerinde olduğu halde diğer sürücü veya yayalara yol vermek gibi davranışları bu nedenle göstermeyecekleri beklenmektedir.

Aynı modelde, literatürdeki genel olumsuz ve uyumsuz kişilik özelliği kavramsallaştırmasını yansıtan işlevsiz dürtüsellik değişkeninin ise tüm olumsuz sürücü davranışları ile pozitif yönlü ilişki ve olumlu sürücü davranışları ile de negatif yönlü ilişki göstermesi beklenmektedir. Literatür taraması sonuçları olumsuz sürücü davranışları konusunda bu beklentileri destekler niteliktedir. Ancak daha once de belirtildiği gibi daha once hiçbir çalışmada dürtüsellik kişilik özelliğinin olumlu sürücü davranışları ile ilişkisi incelenmemiştir. Bu bağlamda negatif ilişki beklenmesinin sebebi ise beklemekle ilgili sorun yaşayan ve yaptıkları davranışların sonuçlarını düşünmeyen işlevsiz dürtüsellik seviyesi yüksek bireylerin kendi yol haklarını başkalarına vermek ya da araçlarını park ederken diğer yol kullanıcılarının rahat hareket edebilmesini göz önünde bulundurmak gibi davranışlarda bulunmasının işlevsiz dürtüsellik seviyesi düşük bireylere göre daha az olası olduğudur.

Genel bağlamsal aracılı modelde dürtüsellik boyutları ile kaza ve ceza sayısı arasındaki aracı değişken olarak sürücü davranışlarına ek olarak sürücü becerileri de incelenmesi önerilebilir. Bu bağlamda işlevsel dürtüselliğin bilşisel ve dikkatle ilgili süreçlerle ilgili olması nedeniyle algı-motor sürücü becerileri ile işlevsiz dürtüselliğe kıyasla daha güçlü ilişki göstermesi ve bu ilişkinin pozitif yönlü olması beklenmektedir. Ayrıca sürücü becerilerinin diğer boyutu olan ve kişilik ve tutumlarla yüksek ilişkili olduğu bulunan güvenli sürücülük becerilerinin (Martinussen ve ark., 2014) işlevsiz dürtüsellikle işlevsel dürtüselliğe kıyasla daha yüksek ilişki göstereceği ve bu ilişkinin negative yönlü olması beklenmektedir. Güvenli sürücülük becerileri, sabırsızlanmadan yavaş bir aracın arkasından sürebilmek, sinir bozucu durumlarda sakin kalabilmek ve hız sınırlarına uymak gibi davranışları içermektedir ve bu davranışların işlevsiz dürtüsellik seviyesi yüksek, yani beklemeye tahammül edemeyen, dürtülerini bastırmada sorun yaşayan ve hazzı erteleyemeyen, bireyler tarafından gösterilmesi işlevsiz dürtüsellik seviyesi düşük

bireylere kıyasla daha az olasıdır. Ancak işlevsel dürtüsellik ile güvenli sürücülük becerileri arasında anlamlı bir ilişki beklenmemektedir, çünkü işlevsel dürtüsellik bir kişilik özelliğinden daha çok bir beceriyi yansıtmaktadır ve ayrıca dürtü kontrolü ile çok ilişkili olduğu söylenemez (Reeve, 2007). Son olarak, araç kullanmak sürekli dikkat gerektirdiğinden, işlevsiz dürtüselliğin sürekli dikkat gerektiren bilişsel aktivitelerdeki performansı düşürücü etkisi (Dickman, 2000) göz önünde bulundurularak, işlevsiz dürtüselliğin algı-motor sürücü becerileri ile de negative yönlü ilişki göstermesi beklenmektedir.

Yukarıda bahsedilen sürücü davranışları ve sürücü becerileri aracı değişkenli birleştirici modellerdeki beklenen bağıntılar bu çalışma kapsamında test edilecektir. Daha önce de belirtildiği gibi dürtüsellik ve sürücülük değişkenleri ilişkisini araştıran hiçbir çalışmada olumlu sürücülük davranışları ve sürücülük becerileri ele alınmamıştır. Ayrıca, çok az çalışmada işlevsel dürtüsellik kavramı ele alınmış olup bunların hiçbirinde işlevsel dürtüsellik ile Sürücü Davranışları Anketi (Driver Behavior Questionnaire) ile ölçülen sürücü ihlalleri, hataları ve ihmalleri boyutları arasındaki ilişki incelenmemiştir. Bu anlamda bu tez çalışmasının literatüre anlamlı katkı yapması beklenmektedir.

Literatür taraması sonuçlarının işaret ettiği bir diğer önemli bilgi ise ilgili literatürde de dürtüsellik kavramının tanımı ve ölçümü ile ilgili tam bir fikir birliği sağlanamamış olmasıdır. Bundan yola çıkarak "sürücü dürtüselliği" gibi bağlama özel bir tanımlamanın gerekliliğinden bahsedilebilir. Ayrıca bu yeni tanımlanacak dürtüsellik kavramın dürtüselliğin hem işlevsel hem de işlevsiz boyutlarını içermesi ve bunların ölçümü için bir ölçek geliştirilmesi literatüre önemli bir katkı sağlayacaktır. "Sürücülük bağlamına özel dürtüsellik" veya "sürücü dürtüselliği" araç kullanırken yapılan davranışların gelecekteki sonuçlarını düşünmeden hızlı ve hatalı ya da hızlı ama hatasız hareket etme eğilimi olarak tanımlanabilir. Görüldüğü gibi bu tanım hem işlevsiz hem de işlevsel dürtüsellik kavramlarını kapsamaktadır. Bu tanımlamaya çerçevesinde bir sürücü dürtüselliği ölçeği geliştirilecek ve yukarıda bahsi geçen modellerdeki bağıntılar hem genel dürtüsellik ölçekleri hem de geliştirilen sürücü dürtüselliği ölçekleri kullanılarak test edilecektir. Bu da bu çalışmanın literatüre çok önemli özgün bir katkısı olarak değerlendirilebilir.

Bunlara ek olarak, literatür çalışması sonuçları göstermiştir ki dürtüsellik ile sürücülükle ilgili değişkenleri inceleyen çalışmaların çoğu üniversite öğrencisi örneklemi ile yürütülmüştür ve endüstriyelleşmiş toplumlarda yapılmıştır. Bu çalışmada Türkiye sürücü örnekleminde geniş bir yaş grubundan veri toplanması planlanmaktadır. Bu çalışmanın literatüre bir başka katkısı da bu örneklem ile dürtüsellik ve sürücü davranışları ilişkisinin çalışılması olacaktır.

## ÇALIŞMA 1: Ölçek Maddelerinin Geliştirilmesi

### Amaç

Yapılan literatür taraması sonucu dürtüselliğin çok çeşitli ölçeklerle ölçüldüğü ve çok çeşitli kavramsallaştırmalarının olduğu görülmüştür. Sürücülük bağlamında kullanılacak ve bu bağlama özel olarak geliştirilmiş bir ölçeğin sonuç değişkenleri yordamada daha başarılı olacağı öne sürülebilir (Özkan & Lajunen, 2005b). Bu çalışmanın da amacı sürücülük bağlamına özel, işlevsel ve işlevsiz dürtüsellik boyutlarını ölçmek üzere ölçek maddeleri geliştirmektir. Maddeleri geliştirmek için aktif olarak araç kullanan 20 kişiyle yarı yapılandırılmış mülakatlar yapılmış ve mülakatlar dinlenerek yazıya geçirildikten sonra her bir dürtüsellik boyutu için listelenen örnekler madde haline getirilmiştir.

### Mülakat Formu

Mülakat soruları geliştirilirken literatür taramasında en sık kullanılan iki genel dürtüsellik ölçeğinin boyutları temel alınmıştır. Bunlar Barratt Dürtüsellik Ölçeği (Barratt Impulsıvıty Scale; BIS) ve UPPS Dürtüsel Davranış Ölçeğidir. Bu ölçeklerin alt boyutlarının içerdikleri maddeler ve tanımlarının incelenmesi sonucunda genel olarak birbirine karşılık gelen bir yapıdan söz edilebilir. BISin motor dürtüsellik boyutu genel dürtü kontrolünü yansıtmakta olup UPPS'in sıkışıklık (urgency) faktörüyle benzerlik göstermektedir. BIS'in dikkatte dürtüsellik faktörü, UPPS'in sebatsızlık (lack of perseverance) faktörüyle benzerlik göstermektedir ve dürtüselliğin genel olarak yapılmakta olan işe konsantre olmada ve sonuna kadar devam edip işleri tamamlamada zorlanma boyutunu yansıtmaktadır. Son olarak,

BIS'in plan yapmama faktörü, UPPS'in tasarlama eksikliği (lack of premeditation) faktörüyle benzerlik göstermektedir ve dürtüselliğin genel olarak geleceği düşünmeme ve sonuçlarını düşünmeden hareket etme boyutunu yansıtmaktadır. UPPS'in bir de dördünce heyecan arama (sensation seeking) boyutu vardır ancak literatürde heyecan aramanın dürtüsellikten ayrı başka bir kişilik özelliği olduğu tartışılmaktadır (Steinberg et al., 2008) ve bu nedenle de geliştirilecek olan sürücü dürtüselliği ölçeği heyecan arama boyutunu içermeyecektir.

Bahsi geçen üç dürtüsellik boyutu dürtüselliğin genel olumsuz ve uyumsuz boyutunu yansıtmaktadır. Bu nedenle bu boyutları ölçmek için mülakatta sorulacak sorulara ek olarak bir de sürücülük bağlamına özel işlevsel dürtüsellik maddeleri geliştirmek için sorular sorulmuştur.

Motor dürtüsellik/sıkışıklık boyutu genel dürtü kontrolünü yansıttığından bu boyut için sürücülük bağlamında örnek davranışlar elde etmek amacıyla katılımcılara "Trafikte/araç kullanırken yapmaktan kendinizi alamadığınız, yapmayı erteleyemediğiniz, içinizden gelen ama gereksiz ya da yanlış olduğunu bildiğiniz davranışlara örnek verbilir misiniz?" sorusu sorulmuştur. Dikkatte dürtüsellik/sebatsızlık ve plan yapmama/tasarlama eksikliği boyutları için sürücülük bağlamına özel örnekler edinmek için ise "Trafikte/araç kullanırken sonucunu çok da düşünmeden yaptığınız davranışlar veya otomatik tepkiler verdiğiniz durumlara örnek verebilir misiniz?" sorusu sorulmuştur. Sürücülük bağlamına özel işlevsel dürtüsellik boyutunda örnekler için ise "Trafikte/araç kullanırken tehlike anında çok düşünmeden, aniden yaptığınız davranışlara ve bu davranışların faydasını gördüğünüz durumlara örnek verebilir misiniz?" sorusu sorulmuştur. Ayrıca her bir sorunun ardından "sizce bu davranışları yapan kişilerin ne tür özellikleri vardır, nasıl insanlar bu tip davranışlarda bulunurlar?", "Sizce neden insanlar bu tür davranışlarda bulunurlar" ve "Sizce bu davranışların sonuçları neler olabilir ve siz bu tür davranışları gösterdiğinizde ne gibi sonuçlarla karşılaştınız?" soruları sorulmuştur.

**Katılımcılar**

Convenience sampling yönteniyel ulaşılan 20 aktif sürücünün yaş aralığı 21 ve 75 olup ortalama yaş 33.5'tir. Bu 20 katılımcının yedisi kadındır (%35). Dört katılımcı

profesyonel taksi sürücüsüdür ve bu kişiler katılımcılar arasında en yüksek toplam km sayısına sahiptir.

### Analiz ve Sonuçlar

Tüm mülakatlar katılımcılardan izin alınarak ses kayıt cihazı ile kaydedilmiştir ve ardından yazılı hale getirilmiştir. Ardından her bir soru için verilen örnekler ve bu örnekler için de "nasılş insane" sorusuna verilen sıfat halindeki cevaplar ayrı ayrı listelenmiştir. Her bir davranış örneğinin ve sıfatın kaç katılımcı tarafından söylendiği (sıklık değeri) ve kaç kere tekrar edildiği (sayı değeri) kaydedilmiş ve bu değerlere göre her bir boyutta davranış örnekleri ve sıfatlar ayrı ayrı sıralanmıştır. Her bir boyutta en yüksek sıklık ve sayı değerlerine sahip ilk 10-15 davranış örneği ve sıfat geliştirilecek sürücülük bağlamına özel dürtüsellik ölçeklerinde kullanılmak üzere seçilmiştir. Son olarak, seçilen davranış örnekleri birer ölçek maddesi haline getirilmişti. Örneğin, "Trafikte/araç kullanırken yapmaktan kendinizi alamadığınız, yapmayı erteleyemediğiniz, içinizden gelen ama gereksiz ya da yanlış olduğunu bildiğiniz davranışlara örnek verbilir misiniz?" sorusuna verilen "hızlı sürmek" cevabının madde haline getirilmiş hali "Yapmamam gerektiğini bildiğim halde hızlı sürmekten kendimi alamam"dır. Bu davranış örneğinin bu şekilde yeniden düzenlenmesindeki amaç dürtüsellik kişilik özelliğinin "kendini kontrol edememe" boyutunun vurgulanmasıdır.

Davranış örneklerinden ölçek maddesi haline getirilen toplam 49 maddeyle "Dürtüsel Sürücü Davranışları Ölçeği" ve toplam 40 sıfatla "Dürtüsel Sürücü Ölçeği" geliştirilmiştir. Bu ölçeklerde yer alan maddeler Appendix'te yer almaktadır.

## ÇALIŞMA 2: Yeni Geliştirilen Ölçeklerin Psikometrik Özellikleri ve Modellerde Öne Sürülen Bağıntıların Test Edilmesi

### Amaç

Bu çalışmanın amacı Çalışma 1'de geliştirilmiş olan iki ölçeğin ve Türkçe uyarlaması yapılan Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği'nin psikometrik özelliklerini ve bu ölçekler kullanılarak genel bağlamsal aracılı modelde öne sürülen

bağıntıların test edilmesidir. Ayrıca, geliştirilen sürücülük bağlamına özel dürtüsellik ölçeklerin kullanıldığı modellerle literatürde hali hazırda kullanılan genel dürtüsellik ölçeklerinin kullanıldığı modellerin karşılaştırmasını yapmak da bu çalışmanın bir başka amacıdır.

## Yöntem

### Katılımcılar

Genel sürücü popülasyonuna ulaşmak için convenience sampling with snowball tekniği kullanılmıştır. Çalışmada kullanılan anket formunun hem basılı hem de internet üzerinden doldurulan versiyonu hazırlanmıştır. Anket formunun doldurulacağı İnternet sitesinin bağlantı adresi sosyal medya sitelerinde birçok farklı kullanıcı tarafından duyurulmuştur. Ayrıca, anket formunun basılı versiyonu da sosyal çevrelerindeki aktif sürücülere doldurtmaları için gönüllülere dağıtılmıştır. Toplam 676 kişi anketi doldurmuştur ancak 170 kişi toplam km sayısının 3000'in altında olduğunu belirttiğinden analizlere dahil edilmemiştir. Son örneklemde bulunan 506 kişinin % 68.8'i anket formunu Internet üzerinden, % 31.2'si ise basılı anket formunu doldurmuştur. Katılımcıların % 32.6'sı kadın olup yaşları 19 ile 76 arasındadır. Ortalama sürücü belgesi sahibi olma süresi 13.05 yıl ve ortalama toplam km sayısı da 159612.65 km'dir.

### Instruments

1. Sürücü Bilgi Formu
2. Barratt Dürtüsellik Ölçeği Kısa Formu (BIS-11-KF)
3. UPPS Dütüsel Davranış Ölçeği
4. Sürücü Davranışları Anketi
5. Sürücülük Becerisi Envanteri
6. Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği
7. Dürtüsel Sürücü Davranışları Ölçeği
8. Dürtüsel Sürücü Ölçeği

## Bulgular ve Tartışma

### Yeni Geliştirilen ve Türkçe Adaptasyonu Yapılan Ölçeklerin Psikometrik Özellikleri

Yeni geliştirilen Dürtüsel Sürücü Davranışları Ölçeği'nin 49 maddesi üzerinde faktör analizi yapılmıştır. Açıklanan varyans kriteri göz önünde bulundurularak (% 40; Reise ve ark., 2000) ve *Scree Plot* incelenerek dört faktörlü yapının uygun olduğuna karar verilmiştir. İlk faktör 13 maddeden oluşmaktadır, iç tutarlık katsayısı .90 olarak bulunmuştur ve "sürücü işlevsel dürtüselliği" olarak adlandırılmıştır. İkinci faktör 11 maddeden oluşmaktadır, iç tutarlık katsayısı .86 olarak bulunmuştur ve "sürücü sıkışıklığı"(driver urgency) olarak adlandırılmıştır. Üçüncü faktör 10 maddeden oluşmaktadır, iç tutarlık katsayısı .83 olarak bulunmuştur ve "sürücü tasarlama eksikliği"(driver lack of premeditation) olarak adlandırılmıştır. Son olarak, dördüncü faktör sekiz maddeden oluşmaktadır, iç tutarlık katsayısı .75 olarak bulunmuştur ve "sürücü sebatsızlığı"(driver lack of perseverance) olarak adlandırılmıştır. Toplamda yedi madde birden fazla faktörden yük alma, kavramsal olarak yük alması beklenilen faktörden .30 değerinin altında yük alma, veya hiçbir faktörden .30 değeri ve üzerinde yük alamama gibi nedenlerle ölçekten çıkarılmıştır. En son analizde, 42 madde ve dört faktörden oluşan ölçek % 44.98 açıklanan varyans oranına sahiptir.

Bir diğer yeni geliştirilen ölçek olan Dürtüsel Sürücü Ölçeği'nin 40 maddesi üzerinde faktör analizi yapılmıştır. Açıklanan varyans kriteri göz önünde bulundurularak ve *Scree Plot* incelenerek iki faktörlü yapının uygun olduğuna karar verilmiştir. İlk faktör 23 maddeden oluşmaktadır, iç tutarlık katsayısı .92 olarak bulunmuştur ve "sürücü işlevsiz dürtüselliği" olarak adlandırılmıştır. İkinci faktör ise 12 maddeden oluşmaktadır, iç tutarlık katsayısı .88 olarak bulunmuştur ve "sürücü işlevsel dürtüselliği" olarak adlandırılmıştır. Toplamda beş madde yukarıda bahsedilen nedenlerle ölçekten çıkarılmıştır. En son analizde, 35 madde ve iki faktörden oluşan ölçek % 43.08 açıklanan varyans oranına sahiptir.

Türkçe uyarlaması yapılan Dickman İşlevsel/İşlevsiz Dürtüsellik ölçeğinin maddeleri üzerinde faktör analizi yapılmıştır. Ölçeğin özgün formundaki faktör sayısı iki olduğundan bu analizde de faktör sayısı iki olarak belirlenmiş ve sonuçlar rapor edilmiştir. Beklenilen iki faktörlü yapı temiz bir şekilde ortaya çıkmış ve

maddeler özgün ölçekte yer aldıkları faktörlerden yük almışlardır. Her bir faktörden sadece birer madde .30 değerinin altında yük aldığından ölçekten çıkarılmıştır. İşlevsiz dürtüsellik faktöründe 11 madde yer almaktadır ve bu faktörün iç tutarlık katsayısı .83 olarak bulunmuştur. İşlevsel dürtüsellik faktöründe ise 10 madde yer almaktadır ve bu faktörün iç tutarlık katsayısı .73 olarak bulunmuştur. En son analizde, 21 madde ve iki faktörden oluşan ölçek % 35.10 açıklanan varyans oranına sahiptir.

Ölçeklere uygulanan faktör analizi sonuçlarının ve güvenirlik değerlerinin tatmin edici bulunmasının ardından, bu yeni geliştirilen iki ölçek yapı geçerliği incelenmiştir. Bunun için yeni geliştirilen ölçeklerin faktörlerinin hali hazırda literatürde yaygın olarak kullanılan ve genel dürtüsellik kavramını ölçen ölçeklerin ilgili boyutlarıyla ilişki örüntüleri incelenmiştir. Sonuçlar genel olarak yeni geliştirilen ölçeklerin yapı geçerliğini destekler niteliktedir. İlk olarak, Dürtüsel Sürücü Davranışları Ölçeği'nin sürücü sıkışıklığı faktörü BIS boyutları içinde en yüksek motor dürtüsellik ile ($r$ = .36, $p$ < .001) ve UPPS boyutları arasında da sıkışıklık ($r$ = .33, $p$ < .001) ile ilişkili buşunmuştur. Aynı şekilde bu ölçekteki sürücü tasarlama eksikliği faktörü de BIS boyutları arasında plan yapmama ile ($r$ = .35, $p$ < .001) en yüksek ve UPPS boyutları arasında da tasarlama eksikliği ile ($r$ = .37, $p$ < .001) en yüksek korelasyona sahiptir. Ayrıca bu yeni ölçekteki dikkat ve konsantrasyonla ilgili faktör olan sürücü sebatsızlığı BIS faktörleri arasında en yüksek korelasyonu dikkatte dürtüsellik ile ($r$ = .40, $p$ < .001) göstermiştir. Son olarak bu yeni geliştirilen ölçekteki sürücü işlevsel dürtüsellik boyutu ile BIS'in motor dürtüsellik boyutu arasında anlamlı bir ilişki bulşunmamıştır. İşlevsel dürtüselliğin genel dürtü kontrolü ile pek de ilişkili olmadığı (Reeve, 2007) göz önünde bulundurularak bu bulgu da ölçeğin faktörlerinin yapı geçerliğini destekler niteliktedir. Son olarak, bu ölçeğin dört faktörü arasında Dickman'ın genel işlevsel dürtüsellik boyutuyla en güçlü ilişkiyi gösteren boyut sürücü işlevsel dürtüselliği olmuştur ($r$ = .32, $p$ < .001). Aynı şekilde bu yeni geliştirilen ölçekte sürücü işlevsiz dürtüselliğini yansıtan üç boyutuyla, yani sürücü sıkışıklığı ($r$ = .32, $p$ < .001), sürücü tasarlama eksikliği ($r$ = .36, $p$ < .001) ve sürücü sebatsızlığı ($r$ = .40, $p$ < .001), Dickman'ın genel işlevsiz dürtüsellik boyutu ile sürücü işlevsel dürtüselliğine ($r$ = -.16, $p$ < .001) göre çok daha yüksek ve ters yönlü korelasyonlu bulunmuştur.

Yeni geliştirilen ikinci ölçek olan Dürtüsel Sürücü Ölçeği'nin sürücü işlevsiz dürtüselliği boyutu BIS'in ve UPPS'in hali hazırda iteratürde tanımlanan anlamıyla genel işlevsiz dürtüselliği yansıtan üçer maddesiyle de pozitif korelasyon göstermiştir ve bu korelasyon katsayıları aynı faktörlerin sürücü işlevsel dürtüselliği boyutuyla olan ve negatif yönlü olan korelasyon değerlerinden yüksektir. Örneğin BIS boyutları ve sürücü işlevsiz dürtüselliği arasındaki korelasyon değerleri sırasıyla plan yapmama, motor dürtüsellik ve dikkatte dürtüsellik için sırasıyla .34, .44 ve .48 iken, bu boyutlarla sürücü işlevsel dürtüselliği arasındaki korelasyonlar sırasıyla -.24, -.06 ve -.20'dir. Son olarak, Dürtüsel Sürücü Ölçeği'nin sürücü işlevsiz dürtüselliği boyutuyla Dickman'ın işlevsiz dürtüsellik boyutu arasındaki korelasyon ($r$ = .46, $p$ < .001) iken, Dickman'ın işlevsel dürtüselliği ile korelasyonu istatistiksel olarak anlamsızdır. Benzer şekilde, sürücü işlevsel dürtüselliği faktörü Dickman'ın işlevsel dürtüsellik boyutuyla ($r$ = .34, $p$ < .001) , Dickman'ın işlevsiz dürtüsellik boyutundan ($r$ = -.14, $p$ < .001) daha yüksek ve ters yönde ilişki göstermiştir. Bu ilişki örüntüsü de Dürtüsel Sürücü Ölçeğ'nin yapı geçerliğini destekler niteliktedir.

## Regrasyon Analizleri

### Yeni Geliştirilen Ölçeklerin Açıkladıkları Varyans

Bu bölümde, iki seri regrasyon analizi yapılmıştır. İlk seri analizlerde yeni geliştirilen ölçeklerin sürücü davranışları ve sürücü becerilerinde açıkladıkları varyans oranları genel dürtüsellik ölçeklerinin açıkladıkları varyans oranlarıyla karşılaştırılmıştır. Tablo 1'de görüldüğü üzere, ilk basamakta yaş, cinsiyet ve toplam km sayısı kontrol edildikten sonra her bir sürücü davranışı boyutu ve sürücü becerisi boyutu için ve her bir dürtüsellik ölçeği kullanılarak ayrı ayrı yapılan analizlerin hepsinde yeni Dürtüsel Sürücü Davranışları Ölçeğinin ve sadece bir analiz (olumlu sürücü davranışları bağımlı değişken olan) hariç Dürtüsel Sürücü Ölçeği'nin genel dürtüselliği ölçen diğer üç ölçekten daha yüksek oranda varyans açıklamıştır.

**Tablo 1. Ölçeklerin açıkladıkları varyans oranları**

| **Bağımlı Değişken:Sıradan İhlaller** | $R^2$ | $\Delta R^2$ | $p$ |
|---|---|---|---|
| Kontrol Değişkenleri | .167 | .167 | .000 |
| BIS-11-KF | .284 | .117 | .000 |

| | | | |
|---|---|---|---|
| UPPS | .306 | .139 | .000 |
| Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .263 | .096 | .000 |
| Dürtüsel Sürücü Davranışları Ölçeği | .541 | .374 | .000 |
| Dürtüsel Sürücü Ölçeği | .396 | .230 | .000 |
| **Bağımlı Değişken:Saldırgan İhlaller** | $R^2$ | $\Delta R^2$ | *p* |
| Kontrol Değişkenleri | .077 | .077 | .000 |
| BIS-11-KF | .111 | .034 | .001 |
| UPPS | .123 | .045 | .000 |
| Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .109 | .031 | .000 |
| Dürtüsel Sürücü Davranışları Ölçeği | .323 | .246 | .000 |
| Dürtüsel Sürücü Ölçeği | .247 | .170 | .000 |
| **Bağımlı Değişken:Hatalar** | $R^2$ | $\Delta R^2$ | *p* |
| Kontrol Değişkenleri | .073 | .073 | .000 |
| BIS-11-KF | .196 | .124 | .000 |
| UPPS | .231 | .158 | .000 |
| Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .228 | .155 | .000 |
| Dürtüsel Sürücü Davranışları Ölçeği | .360 | .288 | .000 |
| Dürtüsel Sürücü Ölçeği | .329 | .256 | .000 |
| **Bağımlı Değişken:İhmaller** | $R^2$ | $\Delta R^2$ | *p* |
| Kontrol Değişkenleri | .050 | .050 | .000 |
| BIS-11-KF | .226 | .177 | .000 |
| UPPS | .232 | .182 | .000 |
| Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .247 | .197 | .000 |
| Dürtüsel Sürücü Davranışları Ölçeği | .379 | .329 | .000 |
| Dürtüsel Sürücü Ölçeği | .316 | .266 | .000 |
| **Bağımlı Değişken:Olumlu Sürücü Davranışlar** | $R^2$ | $\Delta R^2$ | *p* |
| Kontrol Değişkenleri | .067 | .067 | .000 |
| BIS-11-KF | .091 | .024 | .007 |
| UPPS | .199 | .132 | .000 |
| Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .134 | .067 | .000 |
| Dürtüsel Sürücü Davranışları Ölçeği | .251 | .183 | .000 |
| Dürtüsel Sürücü Ölçeği | .167 | .100 | .000 |
| **Bağımlı Değişken:Algı-Motor Beceriler** | $R^2$ | $\Delta R^2$ | *p* |
| Kontrol Değişkenleri | .050 | .050 | .000 |
| BIS-11-KF | .099 | .048 | .000 |
| UPPS | .210 | .159 | .000 |
| Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .213 | .163 | .000 |

| | | | |
|---|---|---|---|
| Dürtüsel Sürücü Davranışları Ölçeği | .463 | .412 | .000 |
| Dürtüsel Sürücü Ölçeği | .392 | .342 | .000 |
| **Bağımlı Değişken:Güvenli Sürücülük Becerileri** | $R^2$ | $\Delta R^2$ | *p* |
| Kontrol Değişkenleri | .077 | .077 | .000 |
| BIS-11-KF | .175 | .098 | .000 |
| UPPS | .239 | .162 | .000 |
| Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .154 | .077 | .000 |
| Dürtüsel Sürücü Davranışları Ölçeği | .452 | .375 | .000 |
| Dürtüsel Sürücü Ölçeği | .345 | .268 | .000 |

İkinci seri regrasyon analizleride genel dürtüsellik kontrol edildikten sonra sürücülük dürtüselliğinin sürücü davranışları ve becerilerindeki varyansı açıklamada hala anlamlı katkıları olup olmadığı incelenmiştir. Tablo 2'te görüldüğü üzere UPPS boyutları kontrol edildikten sonraki basamakta analize giren Dürtüsel Sürücü Davranışları Ölçeği'nin boyutlarının tüm sürücü davranışı ve sürücü becerileri boyutlarındaki varyansı açıklamada anlamlı katkı yaptığı bulunmuştur. Aynı şekilde Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği kontrol edildikten sonra da Dürtüsel Sürücü Davranışları Ölçeği hala sürücü davranış ve sürücü becerileri boyutlarının hepsinde anlamlı oranda varyans açıklamıştır. Bu da sürücülük bağlamına özel dürtüselliğin tanımlanmasının, ölçümünün yapılmasının ve sürücü davranışları ve becerilerini açıklamak için kullanılmasının önemini göstermektedir.

**Tablo 2. Dürtüsel Sürücü Davranışları Ölçeği'nin UPPS ve Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği kontrol edildikten sonra açıkladığı varyans oranları**

| **Bağımlı Değişken:Sıradan İhlaller** | $R^2$ | $\Delta R^2$ | *p* |
|---|---|---|---|
| 1. Basamak: Kontrol Değişkenleri | .167 | .167 | .000 |
| 2. Basamak: UPPS | .306 | .139 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .556 | .250 | .000 |
| **Bağımlı Değişken:Saldırgan İhlaller** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: UPPS | .123 | .045 | .000 |
| 3. Basamak: Dürtüsel Sürücü | .325 | .202 | .000 |

| Davranışları Ölçeği | | | |
|---|---|---|---|
| **Bağımlı Değişken:Hatalar** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .073 | .073 | .000 |
| 2. Basamak: UPPS | .231 | .158 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .385 | .154 | .000 |
| **Bağımlı Değişken:İhmaller** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: UPPS | .232 | .182 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .414 | .183 | .000 |
| **Bağımlı Değişken:Olumlu Sürücü Davranışlar** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .067 | .067 | .000 |
| 2. Basamak: UPPS | .199 | .132 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .289 | .090 | .000 |
| **Bağımlı Değişken:Algı-Motor Beceriler** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: UPPS | .210 | .159 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .488 | .279 | .000 |
| **Bağımlı Değişken:Güvenli Sürücülük Becerileri** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: UPPS | .239 | .162 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .48 | .241 | .000 |
| **Bağımlı Değişken:Sıradan İhlaller** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .167 | .167 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .263 | .096 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .544 | .282 | .000 |
| **Bağımlı Değişken:Saldırgan İhlaller** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .109 | .031 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .323 | .215 | .000 |
| **Bağımlı Değişken:Hatalar** | $R^2$ | $\Delta R^2$ | *p* |
| 1. Basamak: Kontrol Değişkenleri | .073 | .073 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .228 | .155 | .000 |
| 3. Basamak: Dürtüsel Sürücü | .384 | .156 | .000 |

Davranışları Ölçeği

| **Bağımlı Değişken:İhmaller** | $R^2$ | $\Delta R^2$ | $p$ |
|---|---|---|---|
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .247 | .197 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .415 | .168 | .000 |
| **Bağımlı Değişken:Olumlu Sürücü Davranışlar** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .067 | .067 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .134 | .067 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .259 | .124 | .000 |
| **Bağımlı Değişken:Algı-Motor Beceriler** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .213 | .163 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .495 | .282 | .000 |
| **Bağımlı Değişken:Güvenli Sürücülük Becerileri** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .154 | .077 | .000 |
| 3. Basamak: Dürtüsel Sürücü Davranışları Ölçeği | .452 | .298 | .000 |

Aynı şekilde, . Tablo 3'te görüldüğü üzere BIS boyutları kontrol edildikten sonraki basamakta analize giren Dürtüsel Sürücü Ölçeği'nin boyutlarının tüm sürücü davranışı ve sürücü becerileri boyutlarındaki varyansı açıklamada anlamlı katkı yaptığı bulunmuştur. Ayrıca, Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği kontrol edildikten sonra da Dürtüsel Sürücü Ölçeği hala sürücü davranış ve sürücü becerileri boyutlarının hepsinde anlamlı oranda varyans açıklamıştır. Bu da yine sürücülük bağlamına özel dürtüselliğin sürücü davranışları ve sürücü becerilerindeki varyansı genel dürtüsellik kavramına göre daha iyi açıkladığını göstermektedir. Beklenildiği gibi, sürücü davranışları ve sürücü becerilerini yordamada sürücülük bağlamına özel dürtüsellik ölçeğinin genel dürtüsellik ölçeklerinden daha iyi çalıştığı görülmektedir.

**Tablo 3. Dürtüsel Sürücü Ölçeği'nin BIS ve Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği kontrol edildikten sonra açıkladığı varyans oranları**

| **Bağımlı Değişken:Sıradan İhlaller** | $R^2$ | $\Delta R^2$ | $p$ |
|---|---|---|---|
| 1. Basamak: Kontrol Değişkenleri | .167 | .167 | .000 |
| 2. Basamak: BIS | .284 | .117 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .415 | .132 | .000 |
| **Bağımlı Değişken:Saldırgan İhlaller** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: BIS | .111 | .034 | .001 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .252 | .142 | .000 |
| **Bağımlı Değişken:Hatalar** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .073 | .073 | .000 |
| 2. Basamak: BIS | .196 | .124 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .344 | .148 | .000 |
| **Bağımlı Değişken:İhmaller** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: BIS | .226 | .177 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .356 | .130 | .000 |
| **Bağımlı Değişken:Olumlu Sürücü Davranışlar** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .067 | .067 | .000 |
| 2. Basamak: BIS | .091 | .024 | .007 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .169 | .078 | .000 |
| **Bağımlı Değişken:Algı-Motor Beceriler** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: BIS | .099 | .048 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .396 | .297 | .000 |
| **Bağımlı Değişken:Güvenli Sürücülük Becerileri** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: BIS | .175 | .098 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .364 | .189 | .000 |
| **Bağımlı Değişken:Sıradan İhlaller** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .167 | .167 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .263 | .096 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .411 | .148 | .000 |
| **Bağımlı Değişken:Saldırgan İhlaller** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .109 | .031 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .247 | .139 | .000 |

| **Bağımlı Değişken:Hatalar** | $R^2$ | $\Delta R^2$ | $p$ |
|---|---|---|---|
| 1. Basamak: Kontrol Değişkenleri | .073 | .073 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .228 | .155 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .359 | .131 | .000 |
| **Bağımlı Değişken:İhmaller** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .247 | .197 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .369 | .122 | .000 |
| **Bağımlı Değişken:Olumlu Sürücü Davranışlar** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .067 | .067 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .134 | .067 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .183 | .048 | .000 |
| **Bağımlı Değişken:Algı-Motor Beceriler** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .050 | .050 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .213 | .163 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .427 | .214 | .000 |
| **Bağımlı Değişken:Güvenli Sürücülük Becerileri** | $R^2$ | $\Delta R^2$ | $p$ |
| 1. Basamak: Kontrol Değişkenleri | .077 | .077 | .000 |
| 2. Basamak: Dickman İşlevsel/İşlevsiz Dürtüsellik Ölçeği | .154 | .077 | .000 |
| 3. Basamak: Dürtüsel Sürücü Ölçeği | .348 | .194 | .000 |

### Modellerde Öne Sürülen Bağıntıların Test Edilmesi

genel bağlamsal aracılı modelin sürücü davranışları aracı değişken olarak kullanıldığı versiyonunda ilk olarak işlevsiz dürtüselliğin olumlu sürücü davranışlarıyla negatif yönlü ilişki, olumsuz sürücü davranşlarıyla, yani sıradan ihlaller, saldırgan ihlaller, hatalar ve ihmallerle, pozitif yönlü ilişki göstermesi beklenmekteydi. Yeni geliştirilen iki sürücülük bağlamına özel dürtüsellik ölçeğinin sürücü işlevsiz dürtüselliği ve Dickman İşlevsel/İşlevsiz Dürtüsellik ölçeğinin işlevsiz dürtüsellik faktörü kullanılarak yapılan tüm analizlerde bu beklentiler doğrulanmıştır. İşlevsiz dürtüsellik beklemey tahammül edememe ve sonuçlarını çok da düşünmeden hareket etme gibi davranışlarla ilişkili olduğundan (Reynolds ve ark., 2006), işlevsiz

dürtüsellik seviyesi yüksek olan bireylerin trafikte kendi yol haklarından vazgeçerek başkalarına yol verme veya araçlarını park ederken diğer yol kullanıcılarının rahat hareket edip edemeyeceğini göz önünde bulundurmak gibi olumlu sürücü davranışlarında bulunmaları daha az olasıdır. Aynı nedenle, bu bireylerin hız limitlerine uymama veya kırmızı ışıkta geçme gibi sıradan ihlallerde bulunma ve trafikte sinirlendiği bir sürücüye bunu gösterecek davranışlarda bulunma gibi saldırna ihlalerde bulunma olasılığı da daha yüksektir. Son olarak da işlevsiz dürtüselliğin hataya açık çabuk tepkiler verme dürtülerini bastırmada zorlanma yaşamalarından dolayı (Reeve, 2007) bu bireylerin sürücü hataları ve ihlallerinde bulunmaları da daha olasıdır.

Aynı modelde işlevsel dürtüselliğin ilk olarak sıradan ihlallerle pozitif yönlü ilşki göstermesi beklenmekteydi. Yeni geliştirilen iki ölçeğin sürücü işlevsel dürtüselliği faktörü ve Dickman'ın genel işlevsel dürtüsellik faktörü kullanılarak yapılan analizlerin hiçbirinde işlevsel dürtüsellik ile sıradan ilişkiler arasında anlamlı ilişki bulunmamıştır. Bunun nedeni ihlallerin sürücünün ne yapmayı seçtiğiyle iligili olup kişilik faktörülerinin bu seçimi etkilemesi (Elander ve ark., 1993) ancak işlevsel dürtüselliğin daha çok bir beceri olarak görülmesi (Reeve, 2007) olabilir. Bunu destekler nitelikte olarak, kullanılan Dickman ölçeğinde ve bu ölçeğin kavramları baz alınarak hazırlanan iki yeni ölçekte de işlevsel dürtüsellik maddeleri daha çok "yapabilmek" vurgusunu içermekteyken, işlevsiz dürtüsellik maddeleri "yaparım" vurgusunu içermekteydi. Zaten bu nedenle de saldırgan ihlaller ve işlevsel dürtüsellik arasında anlamsız bir ilişki beklenmekteydi ve bu beklenti her üç ölçeğin işlevsel dürtüsellik faktörüyle yapılan analizlerde doğrulandı.

İşlevsel dürtüselliğin hatasızlığı hıza feda etme eğilimi (Reeve, 2007) nedeniyle işlevsel dürtüsellik ile sürücü hataları ve ihmalleri arasında da pozitif yönlü ilişki beklenmekteydi. Ancak hem yeni geliştirilen iki ölçeğin sürücü işlevsel dürtüselliği faktörü hem de Dickman'ın işlevsel dürtüsellik faktörü kullanılarak yapılan analizlerde işlevsel dürtüselliğin sürücü hataları ve ihlalleriyle anlamlı olarak negatif yönlü ilişkisi bulundu. Bunun nedeni, bir tutarlılık motivasyonuyla bireylerin kendi hata ve ihlallerini olduğundan az değerlendirmeleri ya da olduğundan az rapor etmeleri olabilir, çünkü işlevsel dürtüsellik ölçen maddeler genel olarak hızlı düşünme ve hareket etme becerisine yönelik "yapabilirim" vurgusu içermekteydi.

Bunun başka bir nedeni de bu bireyler çok fazla sürücü hatası veya ihmali yapıyor olsalar bile hızlı düşünme ve harekete konusunda yüksek yeteneğe sahip olduklarından bu hataların ve ihmallerin yol açtığı olumsuz durumlardan bu yetenekleri sayesinde kurtulmayı başarabilmektedirler ve bu sayede de sahip oldukları "becerikli sürücü" imajı pekişerek başta yaptıkları hataları ve ihmalleri göz ardı ediyor olabilirler.

Son olarak, işlevsel dürtüselliğin olumlu sürücü davranışlarıyla negatif yönlü ilişki göstermesi beklenmekteydi. Ancak bahsi geçen her üç ölçeğin işlevsel dürtüsellik alt ölçeği kullanılarak yapılan analizlerde işlevsel dürtüsellik boyutunun olumlu sürücü davranışlarıyla pozitif yönde anlamlı ilişki gösterdiği bulundu. Negatif ilişki beklenmesinin nedeni genel olarak olumlu sürücü davranışlarının diğer yol kullanıcılara yol vermek gibi beklemeyi içeren, yani işlevsel dürtüselliği yüksek olan bireylerin odağında olan hızlı hareketi engeleyecek davranışları içermesiydi. Ancak, olumlu sürücü davranışları alt ölçeğinde hızdan feragat etmeyle ilgili olmayan maddeler ve trafik ortamının genel güvenliği ve akşına yönelik davranışlar da bulunmaktadır. Örneğin, "arkadaki aracın ileriyi iyi göremediği durumlarda sinyal vb. ile işaret vererek sollamanın uygun olduğunu belirtmek" veya "sollama yapan sürücüye kolaylık olması için hızını onun geçiş hızına göre ayarlamak" gibi trafikte tetikte olmak ve hızlı bilgi işleme süreçlerini yansıtan davranışları ölçen bu maddeler nedeniyle olumlu sürücü davranışları boyutuyla işlevsel dürtüsellik arasında pozitif yönlü ilişki bulunmuş olabilir. Bunlar işlevsel ve işlevsiz dürtüselliğ ayıran davranışlara örnek olabilir. Özetle, bulgular öne sürülen bağıntıların hepsini olmasa da birçoğunu destekler niteliktedir.

Sürücü davranışlarının aracı değişken olduğu model dışında sürücü becerilerinin aracı değişken olarak yer aldığı modelde önerilen bağıntıların da birçoğu desteklenmiştir. İşlevsel dürtüselliğin algı-motor becerilerle pozitif yönlü, güvenli sürücülük becerileriyle negatif yönlü ilişki göstermesi beklenmekteydi. Her üç ölçeğin işlevsel dürtüsellik faktörü kullanılarak yaplan analizlerde işlevsel dürtüsellik ile algı-motor beceriler arasında pozitif yönlü ilişki bulunmuş ve bu beklenti desteklenmiştir. Ancak, işlevsel dürtüsellik her üç analizde de beklenilenin tersine güvenli sürücülük becerileriyle pozitif yönlü ilişki göstermiştir. Bu sonuç işlevsel ve işlevsiz dürtüselliği birbirinden ayıran genel farkla açıklanabilir. Başka bir

deyişle, işlevsel ve işlevsiz dürtüselliğin her ikisi de üzerine çok düşünmeden hızlı tepki vermedavranışıyla olup işlevsel dürtüsellik bu şekilde davranmak en uygun olduğunda ve bu tür davranışların olumlu sonuçlara yol açtığı durumlarda bu davranış şeklini gösterme eğilimi olarak tanımlanmıştır (Dickman, 1990). Dolayısıyla, işlevsel dürtüsellik seviyesi yüksek olan bireylerin hız uğruna hatasızlığı feda etme eğilimi bulunsa da tetikte olabilme ve dikkat kapasiteleri sayesinde bu hızlı davranışlarında güvenliği de göz önünde bulundurabilme kapasiteleri olduğu öne sürülebilir. Sürücülük bağlamında algı-motor beceriler arttıkça genelde güvenli sürücülük becerilerinin azaldığı görülmektedir (Lajunen et al., 1998). Ancak belki de yüksek algı-motor becerilerin güvenliği de göz önünde bulundurma eğilimiyle birleşimi bu bireyleri "işlevsel dürtüsel" yapan özelliklerdendir.

İşlevsiz dürtüselliğin sürekli dikkat gerektiren aktivitelerdeki performansa olumsuz etkileri nedeniyle (Dickman, 2000) algı-motor becerilerle negatif yönlü ilişki göstermesi beklenmekteydi. Bu beklenti hem Dickman'ın ölçeğininin hem de Dürtüsel Sürücü Ölçeği'nin işlevsiz dürtüsellik faktörleri kullanılarak yapılan analizlerde desteklendi. Ayrıca, işlevsiz dürtüselliğin genel olarak geleceğe dair yönelimin olmayışıyla ve sonuçlarını düşünmeden hareket etmeyle ilişkili olması (Whiteside & Lynam, 2001) nedeniyle güvenli sürücülük beceriyle de negatif yönlü ilişki göstermesi beklenmekteydi. Bu beklenti de her iki ölçeğin işlevsiz dürtüsellik alt ölçekleri kullanılarak yapılan analizlerde desteklendi. Özetle, birkaç istisna dışında, regrasyon analizi sonuçlarının dürtüsellik boyutları ve sürücü becerileri ile ilgili önerilen bağıntıları doğrular niteliklte olduğu sonucuna varılabilir.

## Sonuç

Bu tezin amacı dürtüsellik kişilik özelliği ve sürücülükle ilgili değişkenler arasındaki ilişkiyi inceleyen çalışmaların bir sistematik literature taraması ve sentezini yapmak; ve bu sentez sonucunda ortaya çıkan bazı görece az çalışmış ve eksiklik olduğu düşünülen konularda literatüre katkıda bulunmaktır. İlk olarak, dürtüselliğin işlevsel boyutu ilgili literatürde yeterince ele alınmamıştır ve bu tezin amaçlarından birisi de işlevsel dürtüsellik kavramnı sürücü davranışları ve becerileri bağlamında incelemektir. İkinci olarak da sürücülük bağlamına özel bir dürtüsellik tanımı

yapmak ve bu tanım temel alınarak bu kavramı ölçme araçları geliştirmektir. Bu amaçla ilk olarak bir nitel çalışma yapılmış ve yapılan yarı-yapılandırılmış mülakatlar sonucunda sürücülük bağlamına özel dürtüselliği ölçmek amacıyla iki ölçek geliştirilmiştir. Ardından, nicel bir çalışmada bu yeni geliştirilen ölçeklerin psikometrik özellikleri test edilmiş ve tatmin edici bulunmuştur. Ayrıca bu ikinci çalışmada sürücülük bağlamına özel dürtüsellik ölçekleriyle literatürde hali hazırda kullanılan genel dürtüsellik ölçeklerinin sürücü davranışları ve sürücü becerilerinde açıkladıkları varyans oranları karşılaştırılmış ve sürücülük bağlamına özel dürtüsellik ölçeklerinin daha yüksek oranda açıklayıcı güce sahip olduğu bulunmuştur. Son olarak işlevsel ve işlevsiz dürtüselliğin sürücü davranışları ve sürücü becerileriyle farklılaşan ilişkileri incelenmiş ve öne sürülen bağıntıların büyük kısmı desteklenmiştir.

## Appendix D: TEZ FOTOKOPİSİ İZİN FORMU

**ENSTİTÜ**

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☒

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

**YAZARIN**

Soyadı : Bıçaksız
Adı : Pınar
Bölümü : Psikoloji

**TEZİN ADI** (İngilizce) : The Differential Associations of Functional and Dysfunctional Impulsivity with Driver Behaviors and Skills, Accidents and Offences

**TEZİN TÜRÜ** : Yüksek Lisans ☐ Doktora ☒

Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☒

Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

Tezimden bir (1) yıl süreyle fotokopi alınamaz. ☐

**TEZİN KÜTÜPHANEYE TESLİM TARİHİ**: