



**The Behavior of Drivers Convicted for Road Crimes:  
Characterization Study**

**O Comportamento de Condutores Condenados por Crimes  
Rodoviários: Estudo de Caracterização**

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## Abstract

This study has as main purpose the characterization of the behavior of drivers that have been convicted to probation for road crimes. This investigation uses a questionnaire elaborated by the Escola de Criminologia da Faculdade de Direito da Universidade do Porto and was applied at the Direção Geral de Reinserção e Serviços Prisionais from Oporto's metropolitan area. The sample consisted of 33 adults with *ages* ranging between 19 and 60 (mean=35.73 years old; SD=9.84 and mode=26 years old) and a distribution of *gender* mainly male (87.9%, n=29; female: 12.1%, n=4).

Using the *Driving Behavior Questionnaire* significant positive correlation was found between self-reported accidents and violations and mistakes. A significant positive correlation was also found between driving anger and violations and errors. Additionally, the results obtained by the DBQ were compared to previous studies. Using the *Eysenck Personality Questionnaire* a significant positive correlation was found between psychoticism and self-reported accidents.

**Keywords:** accidents, Driving Behavior Questionnaire; Driver Under Influence; Eysenck Personality Questionnaire; road crimes.

## Resumo

Este estudo teve como objetivo principal a caracterização do comportamento dos condutores condenados, no âmbito de crimes estradais, das equipas da Direção Geral de Reinserção e Serviços Prisionais da área metropolitana do Porto. Foi aplicado um questionário para investigação construído na Escola de Criminologia da Faculdade de Direito da Universidade do Porto. A amostra foi constituída por 33 adultos com *idades* compreendidas entre os 19 e os 60 anos de idade (média=35,73 anos; DP=9,84 e moda=26 anos) e com uma distribuição de *género* maioritariamente do sexo masculino (87,9%, n=29; sexo feminino: 12,1%, n=4).

Usando o *Driving Behavior Questionnaire* (BDQ) foram encontradas correlações significativas positivas entre os acidentes autorrevelados e as violações e erros. Foram ainda encontradas correlações significativas positivas entre a raiva ao volante e os erros e as violações. Adicionalmente, os resultados obtidos no DBQ foram comparados aos de estudos anteriores. Usando o *Eysenck Personality Questionnaire*, foi encontrada uma correlação significativa positiva entre o psicoticismo e os acidentes autorrevelados.

**Palavras-Chave:** acidentes, condução sob o efeito de substâncias, crimes estradais, Questionário de Comportamento ao Volante, Questionário de Personalidade de Eysenck.

## Introduction

Every day millions of people lose their lives on the road. Every year millions of people spend weeks hospitalized due to serious accidents. The trauma caused by road accidents occupied the 9<sup>th</sup> place on the Potential Years of Life Lost Ranking and it is predicted that it will occupy 3<sup>rd</sup> place by 2020.

This study has as its main principle the characterization of convicted road crime drivers' behavior from the Direção Geral de Reinserção e Serviços Prisionais from Oporto's metropolitan area, using a questionnaire elaborated by the Escola de Criminologia da Faculdade de Direito da Universidade do Porto (ECFDUP - Agra, Queirós, Castro, Quintas, & Cardoso).

Primarily we seek to *characterize the individual driver* by collecting information related to age, gender, profession, qualification and driving frequency. Following this we will characterize the *driving behavior* by accessing information on the

*transgressions committed* and the *accidents* in which the driver was involved (especially those in which the driver was proven responsible for) on one hand, and the *international instruments* (on the *passion for driving, road anger and errors, lapses and violations* during the driving activity) on the other. Lastly we seek to analyze the results of the adapted international instruments which aim to measure *personality traits* that may be associated to specific driving behavior and simultaneously to antisocial behavioral patterns, referring to the debate on behavioral awareness between contexts. Subsequent to this characterization the results will be compared to the control groups' (results obtained from the application of the same questionnaire elaborated by the ECFDUP with the same age and gender characteristics) and some correlations will be considered. Finally, there will be a reflection on the results

obtained and the alternative methodologies on the encountered limitations.

It is important to keep in mind that “*this is a complex and interdependent system of representations, values, norms and attitudes that guide and give meaning to individual and collective behaviors.*” (Gomes, 1993).

### State of the Art

**Driving Anger** – defined as the tendency to react with annoyance towards frustrating events in the (situational) context of driving – assumes a relevant role in the manifestation of aggressive driving behavior and risky driving.<sup>1</sup>

**Aggressive driving**, also known as a hostile aggression<sup>2</sup>, is defined by Dula & Geller (2003) as “had any behavior had by an individual while driving, which is intended to cause physical and / or

psychological injury”. The main manifestations of this concept are physical and verbal (obscene gestures and cursing, for example) and the use of the vehicle to express rage (tailgating, for example).

On the other hand, *risky driving*, also known as instrumental aggression<sup>1</sup>, is especially directed to deliberately achieve specific goals such as avoiding being late to a destination. In this case it may consist in the violation of road rules and have as a secondary effect the violation of other drivers’ interests. An example of this is speeding, the use of the emergency lights, tailgating and honking<sup>3</sup>.

Using the DAS – Deffenbacher Anger Scale – to separate the drivers with varying anger levels, the Deffenbacher research group<sup>4</sup> demonstrated that in comparison to drivers with lower levels of anger, the drivers with higher levels of anger had an odds ratio of 3.5-4.0 of having *aggressive behavior* while driving

<sup>1</sup> (Deffenbacher, Oetting & Lynch, 1994) e (Deffenbacher, Deffenbacher, Lynch & Richards, 2003; Deffenbacher, Filetti, Richards, Lynch & Oetting, 2003; Deffenbacher *et al.*, 2000; Deffenbacher, Lynch, Oetting & Swaim, 2002; Deffenbacher, Lynch, Oetting & Yingling, 2001; Galovski *et al.*, 2006; Knee, Neighbors, & Vietor, 2001; Lajunen & Parker, 2001; Neighbors, Vietor, & Knee, 2002 *cit in* Nemerovski, 2009).

<sup>2</sup> Psychology frequently distinguishes between two types of aggression: hostile and instrumental (Bushman & Anderson, 2001; Levelt, 1997 *cit in* SWOV Fact Sheet).

<sup>3</sup> (Lajunen *et al.*, 1998; Parker, Lajunen & Summala, 2002 *cit in* Nemerovski, 2009).

<sup>4</sup> (2003a, 2003b, 2000, 2001 *cit in* Dahlen, Martin, Ragan & Kuhlman, 2003).

and a 1.5-2.0 of revealing *risky behavior* (but not aggressive) while driving. They also demonstrated (*ibidem* Lajunen and Parker, 2001; Underwood et al., 1999) that the propensity of an individual to express feelings of anger while driving is a good predictor for the occurrence of *lapses* of concentration during the driving activity, small losses of control of the vehicle, and close-call accidents. Therefore, even when the drivers are controlled by gender and age, DAS explained between 4 and 25% of the variance in most of the dependable variables<sup>5</sup>. In general, there is still a degree of agreement between investigators that aggressive driving represents a significant proportion of *automobile accidents*, injuries and road deaths.<sup>6</sup>

<sup>5</sup> (Dahlen, Martin, Ragan and Kuhlman, 2004)

<sup>6</sup> (Brewer, 2000; Britt & Garrity, 2003; Crimmins & Callahan, 2004; Deffenbacher, Huff, Lynch, Oetting & Salvatore, 2000; Fong et al., 2001; Galovski & Blanchard, 2004; Galovski et al., 2006; James & Nahl, 2000a; Joint, 1995; Lajunen et al., 1998; Larson & Rodriguez, 1999; Lex report of motoring, 1996; Maiuro, 1998; Novaco, 1991; Parkinson, 2001; Rathbone, 1999; Sharkin, 2004; Shinar, 1998; Tasca, 2000; Underwood, Chapman, Wright, & Crundall, 1999) (Deffenbacher et al., 1994; DePasquale et al., 2001; Ellison-Potter, Govern, Petri & Figler, 1995; Galovski et al., 2006; Lajunen & Parker, 2001; Lajunen et al., 1998; Lawton & Nutter, 2002; Rathbone, 1999; Tasca, 2000; Underwood et al., 1999 cit in Nemerovski, 2009).

*The Passion for Driving* - Due to the inexistence of studies focused on the role that passion for driving plays on the manifestation of aggressive behavior, Phillippe, Vallerand, Richer & Bergeron (2009) conceived one based on the *Dualistic Model of Passion*. In this review, *passion* is defined as a strong inclination towards a popular activity in which time and energy is invested and from which two different types of passion may emerge depending on the type of internalization process: the obsessive and the harmonious<sup>7</sup>.

*Obsessive passion* entails a strong desire – which is not under the individuals' control – to practice a specific activity and it is as if this activity controlled the individual. This internalization derives from intra and/or interpersonal pressure (Deci & Ryan, 2002; cited in Philippe, Vallerand, Richer, Vallières & Bergeron, 2009) such as self-esteem or feeling of social acceptance. The activity may then

<sup>7</sup> (Deci & Ryan, 1985, 2000; Sheldon, 2002; Vallerand, 1997 cit in Philippe et al, 2009).

come to engross the individuals' identity and take to a rigid persistence on the exercise of said activity even when hindered.<sup>8</sup> Such an inflexible commitment towards the activity is susceptible of leading to *negative emotions, anger and frustration* and consequently to an imprudent behavior such as *aggressive driving*. The results systematically show that *obsessive passion* foresees *physical and verbal aggression* while driving and the *aggressive use* of the vehicle.

*Harmonious passion* on the other hand is defined as a strong desire to involve in an activity that is under the individuals' control because it is the result of an independent internalization of the activity in the personal identity<sup>9</sup>. This means that the individuals accepted a determined activity as important without any contingency<sup>10</sup>. Consequently, the individual is capable of a flexible

commitment in the pleasurable activity and of adapting to circumstances when confronted with obstacles to its fulfillment managing not to express negative emotions<sup>11</sup>. Additionally, it has been demonstrated that *harmonious passion* is linked to *positive emotions* during and after the driving activity. Philippe *et al.* (2009) supported these conclusions in three studies in which obsessive passion was related with aggression<sup>12</sup>.

When *obsessively passionate*, the individual wants to proceed with the activity at hand due to an internal compulsion that takes over in such a way that being impeded from proceeding with the activity by an external agent causes *anger* towards this agent<sup>13</sup> leading to

<sup>11</sup> (Mageau, Vallerand, Rousseau, Ratelle, & Provencher, 2005; Vallerand, Blanchard, Mageau, Koestner, Ratelle, Léonard, & Marsolais, 2003).

<sup>12</sup> The first consisted of a questionnaire applied to 133 student drivers, the second replicated the results of the previous one, with a sample of 458 middle-age drivers and, additionally a question was added on recent frustrating driving situations. In an even more convincing way, in the third study, with a driving simulator, 44 men were led to think that while they completed the course, another individual completed another one in which they could come across each other. In reality, the behavior of the second driver was programmed in a way that he would intersect the first drivers' path in more than one occasion. The fact that the car behind honked helped to intensify the pressure. Independent jury rated the *aggressiveness* of the participants driving. Once again, the participant that obtained the highest *obsessive passion* scores drove in a more *aggressive* manner.

<sup>13</sup> (Roseman & Smith, 2001; Scherer, 2001; Smith & Lazarus, 1993)

<sup>8</sup> For example, when confronted with another drivers' erratic driving it is probable that the passionate obsessive will make an effort to continue his/her activity in a rigid and persistent manner (for example, insist on overtaking a slow driver).

<sup>9</sup> (Deci & Ryan, 2000; Ryan & Deci, 2000 *cit in* Philippe *et al.*, 2009)

<sup>10</sup> (Deci & Ryan, 1991; Vallerand, Fortier & Guay, 1997 *cit in* Philippe *et al.*, 2009)

inadequate *aggressive behavior* (Philippe *et al.*, 2009).

### ***Errors, Lapses and Violations***

Reason, Manstead, Stradling, Baxter & Campbell (1990) developed the *Driving Behavior Questionnaire* (DBQ) demonstrating that the *errors* and the *violations* in the driving activity are two categories of behavior empirically distinct. The *errors* were defined as “failure of planned actions to achieve certain desired consequences” and the *violations* as “deliberate deviations from practices deemed necessary for the maintenance of security in a potentially dangerous system”. Unlike the errors, the violations are seen as intentional behavior. The same authors found there was yet a third factor which they named *lapses*. This factor includes memory loss and attention deficit that may cause impediments but present a small probability of jeopardizing road safety (Parker *et al.*, 1995).

The research related to the driving

performance demonstrated that the *violations* present a much larger probability of leading to road accidents than the *errors* and *lapses*<sup>14</sup> constituting therefore a danger towards the driver and those who surround him (Reason *et al.*, 1990).

The practical importance of the distinction between *errors* and *violations* is that they represent different aspects of the tendencies and information processing of the individual (Shinar, 2007; Howard, 2004): the *errors* are based on perceptive processes of attention or judgment whilst the *violations* seem based on attitudinal and/or motivational factors (Howard, 2004). Additional research revealed that the *violations* carry an emotional component that makes drivers “feel good” when perpetrating and the emotion of perpetrating is motivation enough (Dft, 2004 *cit in* Shinar, 2007).

According to Wilde (1989), drivers involve themselves in risky driving

<sup>14</sup> (Evans, 1991; Parker *et al.*, 1995b; Parker, West, Stradling, & Manstead, 1995c; Simon & Corbett, 1996 *cit in* Lawton *et al.*, 1997)

behavior because they believe that the benefits of these actions will prevail over their potential costs. These subjective risk evaluations do not necessarily represent the real risks of a determined driving situation. As the perception of the rewards of *road violations* increases in relation to the perception of its costs these could become rooted as usual driving practices despite their inherent danger (Evans, 1991). It has been found that chronic offenders experience less regret when committing *violations* and underestimate their negative consequences.<sup>15</sup>

### ***Sensation Seeking***

*Sensation seeking* (SS) is one of the variables related to personality that was studied as a predictor of dangerous driving behavior standing out in empirical evidence consisting in a personality trait defined as experiences and feelings, that are "varied, novel, complex and intense", and by the readiness to "take physical,

social, legal, and financial risks for the sake of such experiences. (Zuckerman, 1994). The same author states that "the desire for new stimuli and experiences, direct or indirect, significantly relies on biological mechanisms, and individual differences in this "desire" are based on variations in the underlying biological mechanisms as well as the results of the experience associated with such stimuli (p.174)". This personality trait would be associated to increased levels of testosterone and decreased levels of monooxidase (MAO) in the central nervous system.

Jonah (1997, as cited in White, 2009) reviewed 40 studies on the relationship between SS and varied risky driving behavior<sup>16</sup> and concluded that SS contributes between 10 and 15% to the variance of risky driving. This author stressed furthermore that the majority of the studies found a positive relation between SS and accident involvement. SS

<sup>15</sup> (Parker, Manstead, Stradling & Reason,1992a; Parker, Manstead, Stradling, Reason & Baxter,1992b; Parker, Manstead & Stradling,1995a *cit in* Parker, Reason, Stradling, & Manstead,1995).

<sup>16</sup> Performed with drivers in the United States, Canada, United Kingdom, Netherlands, Sweden, Norway and Finland.

seems to be a strong behavior predictor of various risky driving behaviors (White, 2009; Zuckerman, 1994) and the consequences of driving under the influence of alcohol (DUI)<sup>17</sup>, reckless driving<sup>18</sup>, speeding and circulating in forbidden areas.<sup>19</sup>

White (2009) adds that the drivers with higher levels of SS receive more warnings and have a decreased level of perception of risk while driving in the same lines that Horvath & Zuckerman, 1993; Zuckerman, 1979b (as cited in CHIRr, 2013) had presented that a higher or lower level of SS in an individual influences the way in which risk is perceived.

### ***Impulsivity***

Impulsivity has received much attention in works on accident prevention regarding the individuals' control over

feelings and behavior (Barratt, 1972, as cited in Monahan & J. Steadman, 1996) that may lead to risk taking due to the fact that the individual simply does not have self-control to refrain from doing so. Impulsivity is one of the traits that has frequently been associated to risky behavior (Llewellyn, 2008, as cited in Araújo *et al.*, 2008) and to the violation of traffic laws and automobile accidents<sup>20</sup>. However, the results of studies on the relationship between impulsivity and traffic accidents are still contradictory, as some results find positive correlations<sup>21</sup> and others that document the absence of a relationship (Martin & Estevéz, 2005; Vavrik, 1997; as cited in Araújo *et al.*, 2008). In the origin of such deviation may be methodological differences and/or the way of defining the construct “impulsivity”.

Lajunen and Parker (2001) raised the possibility of impulsivity being related

<sup>17</sup> Arnett, 1990, 1995; Jonah, 1997; Yu & Williford, 1993; Zuckerman & Neeb, 1980 (*cit in* Delhomme, Chaurand, & Paran, 2012); MacDonald & Mann (1992 *cit in* DRUID-Project, 2008); Glitsch, (2003 *cit in* DRUID-Project, 2008); van Berdeun *et al.* (2005 *cit in* DRUID-Project, 2008).

<sup>18</sup> (Arnett, 1990, 1995; Jonah, 1997; Yu & Williford, 1993; Zuckerman & Neeb, 1980 *cit in* CHIRr, 2013).

<sup>19</sup> (Arnett, 1990, 1994, 1996; Arnett *et al.*, 1997; Burns & Wilde, 1995; Clement & Jonah, 1984; Furnham & Saipé, 1993; Greene *et al.*, 2000 *cit in* Delhomme, Chaurand, & Paran, 2012).

<sup>20</sup> (Dahlen, Martin, Ragan & Kuhlman, 2005 *cit in* Araújo *et al.*, 2008)

<sup>21</sup> (Loo, 1978 e 1979; Mayer & Treat., 1977; Schuman, *et al.* 1967 *cit in* Araújo *et al.*, 2008)

to the readiness to act aggressively in a frustrating road situation. This hypothesis was rejected in a self reported study.

***Neuroticism, Psychoticism, Extroversion and Social Desirability***

Since the sixties, the possibility of having accident prone personality types (work or road related) has been presented by Eysenck. This author concluded that around a third of drivers with accidents presented some sort of relationship with crime (Eysenck, 1965, p.223; cited in Agra e Queirós, 2004). On the other hand, “certain personality traits accompany the propensity for accidents and these traits resemble very much those of criminals” (Eysenck, 1965, p.223 *cit in* Agra e Queirós, 2004) such as carelessness, impatience, emotionality, distraction, impulsivity, imprudence or instability – all traits that are associated to

psychotism<sup>22</sup>, neuroticism<sup>23</sup> and extroversion<sup>24</sup>.

According to Agra and Queirós (2004), psychotism is closely linked to an increased no. of accidents, with disrespect for road laws, more serious and frequent transgressions and the expression of harsher reactions towards attitudes and behavior of other drivers.

Mayer and Treat (1977, as cited in Furnham & Saipe, 1993) found that increased levels of psychotism were frequently linked to impulsivity and to law infractions, specifically road law infractions. Neuroticism has been positively correlated to dangerous<sup>25</sup> and aggressive driving<sup>26</sup>, the no. of car accidents, mortality and not enjoying driving (Matthews *et al.*, 1991 *cit in* Dimas *et al.*, 2012). Extroversion has also been positively related to dangerous driving (eg.

<sup>22</sup> Characterized by antisocial, aggressive, cold, impersonal and egocentric attitudes.

<sup>23</sup> Characterized by anxiety, depression, guilt, decreased self-esteem, timidity, instability, irrationality, rigidness and obsession.

<sup>24</sup> Characterized by sociable, active, impulsive, carefree, and adventurous and by seeking strong sensations.

<sup>25</sup> (Booth-Kewley & Vickers, 1994; Matthews *et al.*, 1991; White & Dahlen, 2001 *cit in* Dimas *et al.*, 2012)

<sup>26</sup> (Bone & Mowen, 2006; Dahlen & White, 2006 *cit in* Dimas *et al.*, 2012)

White & Dahlen, 2001; cited in Dimas *et al.*, 2012), road accidents and the use of physical violence with other drivers (Benfield *et al.*, 2007, as cited in Dimas *et al.*, 2012). Recently Lev *et al.* (2008, as cited in Dimas *et al.*, 2012) noticed that individuals that frequently breach traffic rules are more extroverted than those who do not.

### *Self-control*

According to Gottfredson & Hirschi (1990, as cited in Arneklev, Ellis & Medicott, 2006), low self-control comprises six essential dimensions: risk seeking, tendency to perform simple tasks, preference for physical activities (as opposed to intellectual), centration of the individual on himself and finally the existence of a volatile temperament. Low self-control is also describes as a characteristic that sets early in life and remains relatively stable throughout life.

Gottfredson and Hirschi (1990, as cited in Mishra & Lalumière, 2011) propose that individuals with low self-

control present a larger probability of succumbing to temptation that may be pleasurable in the short-term without taking into account the long-term negative consequences and that low self-control leads to general deviance while the combination of low self-control and opportunity is responsible for most, if not all, antisocial and criminal behavior, stating therefore the behavioral consistency between varied contexts.<sup>27</sup>

The self-control theory is supported by considerable evidence suggesting that various forms of risky behavior including risky driving, crime, the use of substances, the early onset of sexual activity, sexual aggression, gambling, delinquency in general and antisocial behavior tend to compete at an intra-individual and aggregate level.<sup>28</sup> As a result, these

<sup>27</sup> (Gottfredson & Hirschi 1990 *cit in* Junger, West, & Timman, 2001).

<sup>28</sup> (eg., Bartusch, Lynam, Moffitt, & Silva, 1997; Donovan & Jessor, 1985; Hirschi & Gottfredson, 1994; Leblanc & Girard, 1997; Lussier, LeBlanc & Proulx, 2005; Mishra & Lalumière, 2009; Mishra, Lalumière, Morgan & Williams; Mishra, Lalumière & Williams, 2010; Osgood, Johnston, O'Malley, & Bachman, 1988 *cit in* Mishra & Lalumière, 2011) (Arneklev *et al.* 1993; Brownfield & Sorenson 1993; Forde & Kennedy 1997; Gibbs & Giever 1995; Gibbs, Giever, & Martin 1998; Grasmick *et al.* 1993; Keane & Arnold 1996; Longshore, Turner & Stein 1996; Nagin & Paternoster 1994; Paternoster & Brame 1998; Paternoster & Simpson 1996; Piquero & Tibbetts 1996; Polakowski 1994; Pratt & Cullen 2000; Sorenson & Brownfield

individuals present an increased probability of being involved in various forms of risky behavior and of suffering the negative consequences associated to these behaviors such as divorce, labor instability and accidents.

Additionally, the individuals that are regularly involved in the various forms of risk taking (including bets and crime) obtain increased scores on the self reported measurements of low self-control, impulsivity and SS<sup>29</sup>.

### **Generalization of Behavior in Different Contexts**

Junger, West, and Timman (2001) hypothesize that the criminal behavior and risky driving behavior reflect a general tendency to risk taking, in other words, not taking into account the possibility of their actions' negative consequences. This was tested through a study with a sample of

1531 individuals involved in road accidents whose data was collected from two independent police data bases: the registry system for road accidents and the offenders' national database. The descriptions of the accidents by the police were used to identify individuals that may have exhibited risky driving behavior and "contributed to" or "caused an" accident.

A Log-linear<sup>30</sup> analysis revealed that the people that demonstrated risky driving behavior that had culminated in an accident had an odds ratio of 2.6 of having a violent crime record; a 2.5 for vandalism, 1.5 for equity crime and 5.3 for involvement in a road crime. These results support the idea that the behavior is consistent throughout different contexts and the idea that there are relatively general traits underlying the several forms of behavior, including crime<sup>31</sup>. This underlying characteristic may represent a general disrespect for the adverse long-

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1995; Tittle, 1995; Wood, Pfefferbaum & Arneklev 1993 *cit in* Junger, West, & Timman, 2001) including one that studied the drivers behaviour (Keane, Maxim & Teevan 1993 *cit in* Junger; West & Timman, 2001).

<sup>29</sup> (eg. Samuels *et al.*, 2004; White *et al.*, 1994 *cit in* Zuckerman, 2007 *cit in* Mishra & Lalumière, 2011).

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<sup>30</sup> Controlled for the exposure, use of alcohol, age and gender.

<sup>31</sup> (Gottfredson and Hirschi 1990; Osgood et al. 1988; Robins and Wish 1977; Rowe, Osgood, and Nicewander 1990; Tellegen 1991)

term consequences of their actions (Junger, Westn & Timman, 2001).

Aside from this study, various other studies reported a relationship between the involvement in accidents and antisocial behavior: the investigation in the United States, Netherlands, Sweden and Canada indicated a relatively strong relationship between the involvement in accidents and crime.<sup>32</sup>

### ***Instruments***

The applied questionnaire (Agra, Queirós, Castro, Quintas, & Cardoso) contemplates the following scales: *Deffenbacher Anger Scale* (DAS) – abbreviated version, *Driving Passion Scale* (SDS), *Driving-Behavior Questionnaire* (DBQ), *Sensation-Seeking Scale-V* (SSS-V), *Barrat Impulsiveness Scale-11* (BIS-11), *Eysenck Personality Questionnaire* (EPQ) and the *Self-Control Scale* by Grasmick.

The propensity to become angered

during driving was measured using an abbreviated version of the 14 items of DAS (Deffenbacher *et al.*, 1994). The items describe scenarios that may potentially cause rage likely to occur when someone is driving. The individuals reply classifying each item according to the degree in which the situations would enrage them using a scale of Likert of five points (1 = “nothing” to 5 = “very much”). This scale was validated in a series of studies that document the relations obtained between aggressive driving and risky driving and the accident outcomes<sup>33</sup>.

The SDS was created from an adaptation of the *Passion Scale* (Vallerand *et al.*, 2003) so as to access the passion for driving. The *Passion Scale* was used in several studies and demonstrated a high level of reliability and validity<sup>34</sup>. The SDS is subdivided into two subscales of six items each: the Subscale of Obsessive Passion and the Subscale of Harmonious

<sup>32</sup> (Farrington and Junger 1995; Glueck and Glueck 1950; Hansen 1988; Junger and Wieggersma 1995; Lawton *et al.* 1997; Robins 1966; Sivak 1983; Tillman and Hobbs 1949; West 1997; West, Elander, and French 1993; West and Farrington 1977; West *et al.* 1997; Yeager and Otnow-Lewis 1990 *cit in* Mishra & Lalumière, 2001)

<sup>33</sup> (Deffenbacher *et al.*, 2000, 2001 *cit in* Dahlen, Martin, Ragan, and Kuhlman, 2004)

<sup>34</sup> (Ratelle *et al.*, 2004; Rip *et al.*, 2006; Rousseau *et al.*, 2002; Vallerand *et al.*, 2003; Vallerand & Houffort, 2003; Vallerand, Rousseau *et al.*, 2006 *cit in* Philippe, 2009)

Passion. The items are quoted on a scale of Likert of 7 levels of response (1=Disagree completely, 7=Agree completely). Additionally to the twelve items of measurement of passion, the participants also completed four items corresponding to the criteria of passion (enjoyment and time invested in driving, if driving is a passion and if it is considered important) (Vallerand *et al.* 2003).

The DBQ consists in an instrument that was adapted for American drivers (Reimer *et al.*, 2005) that consists in 24 affirmations that the participants score from 0 to 5 in which 0 indicates that the person never has that behavior and 5 indicates that the person almost always has that behavior. This scale has three subscales: one for lapses, one for violations and one for errors (Shinar, 2007). Additionally, in this questionnaire three items related to driving in altered states were added.

The SSS-V is a measurement composed by 40 items of forced choice,

used to measure the SS levels (Zuckerman & Eysenck, 1978) and conceived to access the results for thrill and adventure seeking, disinhibition, experience seeking, and boredom susceptibility. It is used as a measurement of constructs of personality and as a measurement of preference for risk (SJDM, 2013). Despite the SSS-V having been extensively used in a variety of contexts, it is not the ideal scale for the use in several contexts of common investigation due to its size and format.

The BIS-11 is used to assess the *impulsivity* of individuals. This scale is composed by 30 items, listed on a scale of Likert between never/rarely and almost always/always<sup>35</sup>, meaning that the larger scores indicate more impulsivity (Dahlen, 2005). In this scale there are 3 subscales: *attentional impulsivity*<sup>36</sup>, *motor impulsivity*<sup>37</sup> and *non-planning impulsivity*<sup>38</sup> that measure, respectively,

<sup>35</sup> (1= never or rarely; 2= occasionally; 3= frequently; 4= almost always).

<sup>36</sup> Focus on the concentration on the tasks, intrusive thoughts and accelerated thoughts.

<sup>37</sup> Tendency to act in the heat of the moment and consistency of lifestyle.

<sup>38</sup> Thought and careful planning and pleasure in mental challenges.

cognitive, motor and impulsivity execution aspects (Constantinou *et al.*, 2011).

The EPQ was designed to access personality traits of psychoticism, extroversion, neuroticism and social desirability. Issues related to impulsivity are included in psychoticism and issues related SS are included in extroversion (SJDM, 2013).

Grasmick's *Self-Control Scale* contemplates 24 items with a Likert's scale of 4 points and focuses on the six dimensions.

### ***Procedures***

First and foremost, a request was presented for authorization from the DRN-DGRSP for the application of the questionnaire in the facilities of the teams in their dependence, the defendants that went there due to cases related to road crimes. When the authorization was granted, the teams corresponding to the areas of Vila Nova de Gaia, Espinho, Póvoa de Varzim, Matosinhos and Gondomar of individuals that

corresponded to the sample criteria were scheduled. After scheduling, it was found that the collection would only be possible in the teams of Porto Penal III and IV. The individuals that attended were received in an individual cabinet where they were explained the objective, conditions and finalities of the study and after obtaining their consent proceeded to the completion of questionnaires. This task had a variable duration between 50 and 150 minutes. The individuals could ask any and all necessary questions they considered necessary to the clarification of any doubts. Some individuals manifested the need for help in the comprehension of the questions demonstrating difficulties (visual, cognitive, or poor reading skills) which made the respective administration of the questionnaire become indirect.<sup>39</sup> After filling it, the questionnaire was put into an envelope and sealed in the presence of the inquired. After collecting it, the data was introduced into a double entry matrix

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<sup>39</sup> When the inquirer completes from the replies that are given by the inquired.

constructed on the program *Statiscal Package for Social Sciences* (SPSS), placing in each line the individual and in each column the question posed.

### **Sample**

The process of sampling used has as its foundation a *sampling by convenience* technique since the elements to which whom had access have been selected. The *sampling criteria* were the interview of individuals with road crimes cases.<sup>40</sup>

**Sociodemographic Variables** - The sample consisted of 33 adults with *ages* between 19 and 60 ( $M=35.73$  years old;  $SD=9.84$  and  $mode=26$  years old) and with mainly male *gender* distribution (87.9%,  $n=29$ ; female: 12.1%,  $n=4$ ). With regard to *marital status*, 54.4% ( $n=18$ ) were single, 24.2% ( $n=8$ ) married or in common law marriage and 21.2% ( $n=7$ ) divorced,

separated or widowed. Regarding the qualifications, 18.8% ( $n=6$ ) of the individuals completed the 4<sup>th</sup> grade; 34.4% ( $n=11$ ) completed the 12<sup>th</sup> grade and 28.1% completed secondary education, 3.1% ( $n=1$ ) are baccalaureates, 12.5% ( $n=4$ ) are graduates and 3.1% ( $n=1$ ) possessed a qualification superior to that of a degree.

### **Variables Related to Driving**

The mean *no. of years driving* is 15.1 years ( $SD=9.55$ ), 2 being the minimum and 47 the maximum. The variable *mean kilometers driven in a year* is important for controlling the exposure to risky situations, the mean being 19.487 km/year ( $SD=29.441.792$ ; minimum 364km/year and maximum 156.000km/year). Most individuals drive *daily* (78.1%,  $n=25$ ). The variable “*driving function*” – understood as purpose or goal – it was found that most drivers use the vehicle as a “means of transport for the accomplishment of an activity with a fixed schedule” (75.8%,  $n=25$ ), 39.4% ( $n=13$ ) of

<sup>40</sup> Including driving without a license, driving under the influence of alcohol, driving under the influence of drugs ( $n=1$ ) and/or dangerous driving ( $n=1$ ) under any measure (Provisional case suspension, substitution of the fine for work, community work, suspension of the execution of prison time, structured activity “*0 rate*” and/or the rehabilitation program “*STOP-Responsibility & Safety*”).

individuals reports that “the use of the vehicle is indispensable for the exercise of the professional activity (e.g., Vendor, distributor)” reducing the no. of individuals (n=4, 12.2%) that use the vehicle for recreation purposes (all terrain routes, orientation circuits outside of the city, competitions, tuning, etc.) and that exercise “driving as a profession” (n=4, 12.2%).

## Results

*Self reported Behavior* - More than half of the individuals have had their license apprehended (n=19, 57.6%).<sup>41</sup> When the answer is affirmative the inquired is asked to indicate the reason for the apprehension. From the reasons indicated, DUI assumes a great significance (n=14, 73.68%) alongside other four reasons by four different individuals (“disobedience”, “police arrogance”, “overtaking on a pedestrian

crossing and passing a red light” and “delay in the payment of a fine”).

Only one individual from the sample has never been fined, the mean being 4.59 fines per individual which may be considered an indicator of its inefficiency in the reducing of relapse. Regarding the type of contravention the prevailing ones are “excess of alcohol or drugs (n=24, 75%)”, “inappropriate parking (n=16, 50%)” and “driving without a license (n=6, 18.75%)” and only one (3.1%) individual was fined for “use of mobile phone” and one (3.1%) for “stepping a continuous line”; 41.9% (n=13) of individuals admitted to having driven without a driving license (2 individuals did no answer this question), 66.7% of which were underage when doing so. The time of driving with no drivers license is disparate due to the fact that among the drivers that drove with no driving license 30.76% (n=4) report to have done so as a way of learning-practicing for exam preparation and 38.45% (n=5) for a period equal to or

<sup>41</sup> However care must be taken in the interpretation of this data by recalling that 12.1% (n=4) do not possess a driving license so it could not have been apprehended.

great than six years, the maximum being 27 years. 66.7% (n=22) of individuals admits to having been involved in an accident while driving, the mean among these being 1.86 accidents per individual. 71.5% (n=15) of individuals involved in accidents were proved responsible for at least one of the accidents in which they were involved as drivers. Among these, material damage was the most common consequence (72.25%, n=13), followed by “minor injuries and material damage” (11.1%; n=2), “serious injuries” (5.6 %, n=1), “serious injuries and material damage” (5.6 %, n=1) and “death” (5.6 %, n=1).

Regarding the probable causes of the accidents in question, human factors (speed, excess alcohol, fatigue and distraction), environmental factors (surface conditions and rain) and other drivers are indicated. Special importance is assumed by DUI (9.3%, n=3) and speeding (9.3%,

n=3). Three individuals (corresponding to 9.3% of the sample) carry with them self-defense objects when travelling, distributed: one with a “razor, penknife or knife” (n=1, 3.1%), one with a “firearm and paralyzing or irritating spray” (n=1, 3.1%) and one with a “firearm and whip, iron bar, baseball bat or stick”. No individual was caught by the police for speeding and only one was fined for this reason. 39.28% (n=11) of the individuals are aware of other people that have been fined for speeding.

### *Probability Estimates*

The individuals considered that the probability of during the course of the next year: “speeding”, on average, of 2.09 ( $SD=1.4$ ), of being caught by the police doing so, on average, of 1.94 ( $SD=1.458$ ) and of “speeding under the influence of alcohol”, on average, of 1.36 ( $SD=1.113$ ) and of being caught by the police doing so, on average of 1.52 ( $SD=1.228$ ).

**Table 1**

DGRSP drivers' profile: Passion, angry and errors, lapses &amp; violations

Measure/Dimension	N	Min.	Max.	M	SD	
<b>Passion</b>	33	1	5.5	3.33	1.14	
<b>Harmonious passion</b>	33	1	7	4.5	1.59	
<b>Obsessive passion</b>	33	1	5	1.85	.94	
<b>Driving Anger Scale</b>	33	1.14	4.21	2.75	.73	
<b>Driving Behavior Questionnaire</b>	Errors	33	8	25	13.64	4.1
	Lapses	33	8	28	15.09	5.1
	Violations	33	8	20	13.18	3.1

Regarding the *Passion for driving*, the sample presents a mean value of 3.33 ( $SD=1.14$ ), being the levels of *Harmonious Passion* (mean=4.5,  $SD=1.59$ ) higher than those of *Obsessive Passion* (mean=1.85,  $SD=0.94$ ). The mean value of the sample regarding *Driving Anger* was 2.75 ( $SD=0.73$ ), being the larger value found relatively high (4.21). In the *DBQ*<sup>42</sup> the values were the following: *Errors*: 13.64 ( $SD=4.1$ ), *Lapses*: 15.09 ( $SD=5.1$ ) and *Violations*: 13.18 ( $SD=3.1$ ) (Table 1).

#### **Personality Characteristics (Table 2)**

Regarding Eysenck's Personality Scale the sample presented low levels<sup>43</sup> of *psychoticism* (mean= 2.06,  $SD=1.48$ ) and of *neuroticism* (mean=4.58,  $SD=3.25$ ); a considerable value of social desirability (mean=7.3;  $SD=2.84$ ) and relatively high levels of extroversion (mean=9.91;  $SD=1.48$ ). The mean *total score* for *sensation-seeking*<sup>44</sup> among the sample is 15.73 ( $SD=5.41$ ), being the minimum 6 and the maximum 25. Decomposing it, there may be found, in ascending order, *Boredom Susceptibility* with a mean of 2.33 ( $SD=1.78$ ), *Disinhibition* with a mean of 3.39 ( $SD=1.68$ ); *Experience Seeking*

<sup>42</sup> The maximum value that each category may reach is 48.

<sup>43</sup> The maximum value for each dimension may reach 15.

<sup>44</sup> The maximum value that the total scores may reach is 40, 10 in each dimension.

with a mean of 4.88 ( $SD=2.33$ ) and *Thrill and Adventure Seeking* with a mean of 5.12 ( $SD=1.88$ ). The mean *total score* for *Impulsivity* is 61.85<sup>45</sup> ( $SD=6.08$ ). In this sample, *Attentional Impulsivity* has a mean of 17.64 ( $SD=1.93$ ) and *Motor Impulsivity* a mean of 17.64 ( $SD=1.93$ ) and *impulsivity related to non-planning* a mean of 24.55 (3.33). The sample's mean value in Grasmick's Self-control Scale is 2.31 ( $SD=0.21$ ).

### Correlations<sup>46</sup>

Significant positive correlation was found between *driving anger* and the violations ( $\rho=0.46$ ,  $N=33$ ,  $p<0.05$ ), the *errors* ( $\rho=0.35$ ,  $N=33$ ,  $p<0.05$ ) and the *lapses* ( $\rho=0.37$ ,  $N=33$ ,  $p<0.05$ ) and *violations*.

**Accidents** - Regarding accidents, the result varies according to if the question's formulation refers to the drivers' involvement or the placement of responsibility in an accident. On one hand, a moderate significant positive correlation was found between the "no. of accidents in

which individuals were involved as drivers" and the *violations* of the DBQ ( $\rho=0.49$ ,  $N=21$ ,  $p<0.05$ ). This means that as the involvement in accidents increases, the *violations committed* become more frequent. On the other hand, a moderate significant positive correlation was found between "the no. of accidents in which an individual was proven responsible" and the *errors* of the DBQ ( $\rho=0.49$ ,  $N=21$ ,  $p<0.05$ ). This means that as the attribution of responsibility increases, committing *errors* becomes

<sup>45</sup> The maximum value that the total score of this scale may reach is 120, 40 in each one of the three factors.

<sup>46</sup> The *Spearman* correlation coefficient was used due to the fact that the variables did not permit the use of parametric statistics.

**Table 2***DGRSP drivers' personality traits characteristics*

Scale	Dimension	Min.	Max.	M	SD
<b>Eysenck's Personality Questionnaire</b>	Neuroticism	1	12	4.58	3.25
	Psychoticism	0	5	2.06	1.48
	Extroversion	3	12	9.91	2.59
	Social Desirability	2	12	7.3	2.84
<b>Sensation- Seeking Scale</b>	<b>Total</b>	6	25	15.73	5.41
	Disinhibition	0	6	3.4	1.68
	Boredom Susceptibility	0	6	2.33	1.78
	Experience Seeking	1	8	5.12	1.88
	Thrill and Adventure Seeking	1	9	4.88	2.33
<b>Barrat Impulsiveness Scale – V</b>	<b>Total</b>	52	74	61.85	6.08
	Attentional	14	22	17.64	1.93
	Motor	14	26	19.67	3.18
	Non Planning	18	34	24.55	3.33
<b>Self-Control Scale (Grasmick)</b>	(construct)	1.88	2.71	2.32	.21

more frequent. There was no significant correlation found between *lapses* and the “involvement in accidents”, nor between *lapses* and the attribution of responsibility for them. There was a strong significant positive correlation between the “no. of accidents in which the individuals were involved” and *psychoticism* ( $\rho=0.57$ ,  $N=21$ ,  $p<0.05$ ) which indicated that a higher incidence of behaviors and attitudes corresponding to this dimension, reported by the defendants, implies a higher no. of accidents in which they were involved. On the other hand a strong significant positive

correlation was found ( $\rho=0.58$ ,  $N=21$ ,  $p<0.05$ ) between the “no. of accidents in which the individual was proved responsible” and *social desirability*. There were no significant correlations found between the variables related to accidents and: the dimensions of *extroversion* and *neuroticism*, impulsivity, *SS* and self-control.

#### *Estimate probability of speeding in the course of the next year*

A moderate significant positive correlation was found between the estimate probability of speeding and

extroversion ( $\rho=0.418$ ,  $N=32$ ,  $p<0.05$ ); *sensation-seeking* ( $\rho=0.43$ ,  $N=32$ ,  $p<0.05$ ), in particular the dimension of experience seeking ( $\rho=0.51$ ,  $N=32$ ,  $p<0.05$ ) and impulsivity ( $\rho=0.38$ ,  $N=32$ ,  $p<0.05$ ), in particular motor impulsivity ( $\rho=0.38$ ,  $N=32$ ,  $p<0.05$ ). A moderate significant positive correlation was found between the estimate of speeding DUI and: extroversion ( $\rho=0.44$ ,  $N=33$ ,  $p<0.05$ ), *Thrill Adventure Seeking* ( $\rho=0.45$ ,  $N=32$ ,  $p<0.05$ ) and *Experience Seeking* ( $\rho=0.35$ ,  $N=33$ ,  $p<0.05$ ). No significant correlation was found between the self-control scale and the estimate probability of speeding and DUI and speeding, neither of being caught doing so.

### Discussion of Results

There is a clear disparity regarding the gender of the individuals. These differences in gender concerning criminal behavior are well known; as Gottfredson e Hirschi (1990 *cit in* Lagrange & Silverman, 1999) claim, the men anytime, anywhere offend more than women.

From the analysis of the characterization of this sample it is noticeable that DUI, and for inference, the consumption of alcohol is the main problem, or put more modestly, the most evident one. It is necessary to take into account that even though none of the individuals was caught by the police for speeding, and only 1 was fined for this reason, 3 individuals indicate this reason as the probable cause of accidents in which they were proved responsible (the same no. that stated DUI).

The correlation found between *driving anger* and the *errors* and the *violations* are in agreement with the studies that show as better predictors of errors and violations of drivers the emotional alterations, specially episodes of driving anger<sup>47</sup>. It must be recalled that all correlation points towards a potentially bi-directional relationship which means that anger may be configured as an antecedent

<sup>47</sup> (Arnett e cols., 1997; Blocke & Hartley, 1995; Lajunen & Parker, 2001; Lowenstein, 1997; Parker, West, Stradling & Manstead, 1995; Reason e cols, 1990; Underwood and cols., 1999; Yagil, 2001)

of errors and violations just as well as the commitment of errors and violations may cause more anger in the driver. Regarding the relationship between “*violations, errors and lapses*” and accidents, the correlations found differ whether regarding the involvement of individuals (as drivers) in accidents or the respective attribution of responsibility. Recalling, a moderate significant positive correlation between “no. of accidents in which individuals were involved as drivers” and *violations* of DBQ ( $\rho=0.493$ ,  $N=21$ ,  $p<0.05$ ) was found. According to Winter and Dodou’s meta-analysis (2010) a significant positive correlation between *violations* and self reported accidents in 42 samples (for example, Stradling *et al.*, 1998). A moderate significant positive correlation was also found between “the no. of accidents in which the individual was proven responsible” and the *errors* of DBQ ( $\rho=0.490$ ,  $N=21$ ,  $p<0.05$ ). In the meta-analysis mentioned above this correlation was found in 32 samples (for

example, DeLucia *et al.* 2003 or the Freeman *et al.*, 2009 study in large scale, with 4.792 drivers). The results of these authors show that *violations* and *errors* are equally strong predictors of self reported accidents. As Reason *et al.* (1990, as cited in Winter & Dodou, 2010) stated, the DBQ is a powerful means of measuring the behaviors that “are too private to be detected by direct observation “but at the same time, their answers “are several stages removed from the actuality of what goes on behind the wheel” (pp. 1329–1330). Additionally, questioning the drivers on the lapses during driving is, in a way, ironic: “Unconscious errors can be difficult to remember precisely because they are unaware” (Bjørnskau & Sagberg, 2005, p. 137, cited in Winter & Dodou, 2010).

The strong significant positive correlation found between psychoticism (characterize by the seeking by the individual for immediate satisfaction of its pleasure, regardless of its consequences)

and the no. of accidents in which the individuals were involved partially meets that found by Agra and Queirós (2004):

*“The most relevant fact is that the psychoticism, and then the offender personality arise associated very significantly the highest number of accidents with responsibility (...)”* (p.75).

The term “partially” was used because there was no correlation found between this dimension and the attribution of responsibility.

It is interesting to verify that the

### Table 3

Comparison of results obtained in the Driving Behavior Questionnaire with a prison population and control group

	ERRORS		LAPSES		VIOLATIONS	
	N	M	N	M	N	M
<b>Control</b>	276	6.64	284	7.86	278	8.19
<b>DGRSP</b>	33	13.64	33	15.09	33	13.18
<b>Road Crimes</b>	14	14.64	15	15.87	14	16.93
<b>Other Crimes</b>	35	16.54	37	18.11	36	18.19

Given the invariable increasing tendency with decreased levels of population control, followed by the sample of road crimes from the social reintegration

estimate probability of speeding has a positive correlation with extroversion, SS and with the impulsivity regarding speeding. After comparing between DGRSP and the control group (568 cases male, with the same characteristics regarding age, provided by the ECFDUP) the most relevant differences are the ones regarding the categories of the DBQ. Actually, the results obtained from DGRSP seem similar to the ones collected from the prison (Table 3).

services, immediately followed by road crimes in prison population and finally other crimes in prison.<sup>48</sup>

<sup>48</sup> Courtesy of the graduate Gilda Dias dos Santos, 2012.

### **Conclusions, Limitations and Future Orientations**

It is necessary to take into account that the no. of variables involved in road crimes and in the occurrence of accidents is extremely high which complicates the empirical estimation and the formulation of propositions that have the pretension of being “scientific laws”: it is important to continue developing and deepening studies in this area given the relevance of the legal interests at stake (communication security, life). Beyond the contribution for the clarification of this phenomenon, the investigation in this field is of extreme importance for a sustained intervention in the empirical evidence and adequate to the necessities of each population.

However, data regarding fines and the apprehension of drivers’ licenses is extremely conditioned by the action of the formal control system demanding a minimum knowledge on how the system deals with these crimes (implemented measures, for example).

The use of a quantitative method “allows for the possibility of quantifying a plurality of data and carry therefore numerous correlation analysis”. However, “the credibility of this device assumes a relatively fragile character: rigor in the selection of the sample, clear and unambiguous wording of the questions, correspondence between the universe of reference questions and the reference population of the interviewee, atmosphere of trust at the time of application, honesty and conscientiousness of interviewers” (Quivy & Campenhoudt, 2008). The largest obstacles found in the application of this questionnaire were its length and questions 15.3 and 19.3 (regarding the no. of times people the inquired knew had been fined for a specific reason) in which the defendants were unsure whether to reply with the incidence or the prevalence. The separation between “separated and divorced” and “widowed” seems more adequate to the literary reality (example, DRUID-Project, 2008) that the inclusion

of two items in the same rubric seeing as the different marital statuses seem to assume a different relevance in road crimes: drivers that constitute a larger risk have a larger probability of having a disrupted or conflictive family relationship (Evans, 1991).

Equally noticeable was the fact that the results obtained could have been more significant if there had been a larger sample. However, a collection of a larger no. of cases was not possible due to scarce application time.

It is also thought that some individuals, specially due to the individual application conditions, replied to the questionnaire according to what they thought was more socially correct, trying to pass a better image of themselves and consequently some replies may be biased due to social desirability<sup>49</sup>.

Regarding the DBQ, quasi-experimental studies on the influence of social desirability demonstrate that this

factor is not very relevant (Porter, 2011, p.57).

We may highlight various alternative methodologies to self reported questionnaires found in the bibliographical revision having been themselves object of recent revision by Dula et al. (2012).<sup>50</sup> It would be interesting regarding the issue of behavioral consistency within contexts for the sake of exploratory study, to try to understand what other crimes compete more frequently with road crimes. It would also be interesting a segmented study between repeat offenders and first time offenders to try to understand what these differences are associated to, as well as isolate the individuals whose crimes relate to alcohol.

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<sup>49</sup> (measured by Eysenck's *Lie Scale* these individuals present a mean=7.3030; SD=2.84479)

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<sup>50</sup> namely: telephone surveys, mail surveys, log and checklist registration, observing the driving behavior in the real world, direct observation, video recordings (several variants are presented, for example, by Boyce and Geller (2001)) and simulations (used for example in the study of Montréal described above by Philippe et.al, 2009 as a complement to studies with instrument based on self-report) and official record (also subject to various bias sources, mainly the dark numbers).

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