Can traffic violations be traced to gender-role, sensation seeking, demographics and driving exposure?

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ABSTRACT

Background: Traffic safety is often expressed as the 'inverse of accidents'. However, it is more than the mere absence of accidents. Past studies often looked for associations between accidents and self-reports like the Driver Behaviour Questionnaire (DBQ; Reason, Manstead, Stradling, Baxter, & Campbell, 1990). The focus in this study changed from counting accidents to quantifying unsafe acts as violations. The objective was to show that drivers' specific violations can be traced to personal characteristics such as sensation seeking (SSS-V; Zuckerman, 1994), gender role (BSRI; Bem sex role inventory, Bem, 1974), demographics, and driving exposure.
Method: A web-based questionnaire was distributed, integrating several known questionnaires. Five hundred and twenty-seven questionnaires were completed and analyzed.
Results: Sensation seeking, gender role, experience, and age predicted respondents' score on the DBQ, as well as the interaction of sensation seeking with gender and gender role. Gender role was a more valid predictor of driver behavior than gender.
Conclusions: The effect of gender role on drivers' self-reported violation tendency is the most interesting and the most intriguing finding of this survey and indicates the need to further examine gender role affects in driving.

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1. Introduction

1.1. Traffic violations

When safe/unsafe driving behavior is studied, the most frequent dependent variable is 'accidents'. Traffic safety is often equated with 'the inverse of accidents', though, traffic safety is more than the mere absence of accidents. Ranney (1994) argued that looking at accidents is insufficient for understanding driving behavior. Indeed, driver behavior refers to what drivers tend to do in typical situations (i.e., habitual behavior), within their limits of performance and given their needs, motivation, and goals (Näätänen & Summala, 1976; Shinar, 1978).

In the current study we propose to study driver behavior by looking at traffic violations. Reason (1990) defined violations as "deliberate deviations from those practices deemed necessary to maintain the safe operation of a potentially hazardous system" (p. 195), see also Weller, Schlag, Gatti, Jorna, and van de Leur (2006). In the case of driving, this would be deliberate deviations from accepted procedures, standards and rules of safe driving (such as speeding). Research has shown that violations are associated with enhanced crash involvement (Lindgren, Broström, Chen, & Bengtsson, 2007). Comparing

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violations with errors, Reason (1990) argued that errors are related to an individual's cognitive processes while violations concern the social context in which they occur. Errors may be minimized by retraining and memory aids. Violations can only be dealt with by trying to change users' motives, attitudes, beliefs and norms, and by improving the overall safety culture (Lindgren et al., 2007).

Distinctions among types of 'violations' are also mentioned within the literature; **Unintended** vs. **Deliberate** violations (Reason, 1990), or **Aggressive** vs. **Ordinary** violations (Harrison, 2009; Lajunen, Parker, & Summala, 2004). Common to all is the understanding that violations are intentional, motivational acts which are influenced by peoples' attitude and personality. It is important to note that 24 years after the influential article of Reason, Manstead, Stradling, Baxter, and Campbell (1990), the DBQ has gained enormous popularity. Currently, at least 174 studies have used the DBQ or a modified version (Mattsson, 2012). There are different ways to distinguish violations tendency based on Reason's questionnaire, for example Rimmö and Åberg (1999) used 8 questions representing violation as one factor, while Freeman, Wishart, Davey, Rowland, and Williams (2009) used slightly different questions divided into two factors; 'Highway code violations' (8 questions) and 'Aggressive violations' (4 questions). In another study, using a two-factor solution (*violation* and *errors*) showed better time-across stability than the four-factor structure (Özkan & Lajunen, 2006).

The theory of planned behavior (TPB; Ajzen, 1985) is the most commonly used theoretical model to predict violations as willingly committed behaviors (Forward, 2009). Disregarding the speed limit is the most frequently reported violation. Some drivers believe that they could speed but still drive safely. It is more convenient to believe that speeding only gets you quicker to your destination (see for example Mannering, 2009). Speeding is related to beliefs which minimize the perception of risk. Moreover, with practice and experience the problem of speeding is worsened as the illusion of control increases. To reduce the number of violations, one must focus on the motivation behind unsafe driving acts. There has to be an understanding of attitudes of road users prior to developing effective remedies (Forward, 2008, 2010).

1.2. Drivers' characteristics

The ambition of this research was to investigate whether gender role is a better predictor than gender. Yet, one cannot ignore other factors which can explain and predict violations and aggressive behavior in traffic. Much of the research that aims to understand human factors in driving, emphasize the relationships between personal characteristics such as personality components, experience, and gender and driver behavior. Various studies dealt with personality components that lead to accident proneness, e.g., risk-taking (e.g. Iversen & Rundmo, 2002; Ulleberg, 2001). Others studied attention disorders and the effect of fatigue, aggressive and violent driving (Factor, Mahalel, & Yair, 2007). Several researchers (Cacciabue & Saad, 2008; Jonah, Thiessen, & Au-Yeung, 2001; Rudin-Brown & Ian Noy, 2002) have emphasized specific personality traits, such as "sensation seeking" (Zuckerman, 1994) and "locus of control (LOC)" as relevant to driver behavior. However LOC failed to differentiate between those who participated in high-risk leisure activities compared to their non-participated counterparts (e.g., Le Roux, 2014).

Personality traits and driving behavior have been found to have moderate but significant correlations ($r = 0.13$–0.38; Sümer, Lajunen, & Özkan, 2005). Most articles show correlations between **sensation seeking** (SS) and some aspects of risky driving (Weller et al., 2006). Jonah (1997) found that drivers who score high on measures of sensation seeking are more likely to commit driving violations, receive higher scores for risky driving and are involved in accidents more often. Studies show significant positive relations between SS and aggressive and risky driving (e.g. driving while impaired, speeding, see Dahlen & White, 2006). Sensation-seeking was found to predict violations ($r = 0.29$–0.4, $p < .05$; Schwebel, Severson, Ball, & Rizzo, 2006; Schwebel et al., 2007), and specifically predict speeding ($r = .33$, $p < .01$; Machin & Sankey, 2006, 2008). In Rimmö and Åberg (1999), violations were associated with high scores on the sensation seeking scales (thrill and adventure ($\beta = 0.23$) and disinhibition ($\beta = 0.4$)), and with gender (males, $\beta = 0.22$). Furthermore, Ayvaşık, Er, and Sümer (2005) found that high sensation seekers, male drivers, with high scores on monotonous and selective attention computerized tests were more likely to have higher numbers of traffic violations.

Experience, i.e., the accumulation of knowledge or skills that result from direct participation in the driving activity (Cacciabue & Carsten, 2010) is another topic that is often considered. De Winter and Dodou (2010) conducted a Meta-analysis of the relationship between drivers' violations and their age and experience. It was revealed that violations decrease with age ($r = -0.22$ to -0.36), but change only slightly with experience in terms of driven mileage ($r = 0.06$–0.12). It was also revealed that the DBQ violations factor correlated with driving speed, gap acceptance behavior, and lane position variability in a driving simulator and with logged speeding in real cars. A recent study (Cordazzo, Scialfa, & Ross, 2016) aimed to determine the DBQ scales' consistency with a more contemporary view of unsafe driving behaviors (inattention errors, age related problems, distraction and hurry, and aggressive violations). They found that people who drove more kilometers per year had higher scores on factors such as 'distraction and hurry' and 'aggressive violations' and lower scores on age related problems. As for age (ranged 19 to 80+), the older the drivers, the lower their DBQ scores were, except for the 'age related problems' factor which had the opposite effect.

With regard to **gender**, the literature on gender differences in aggressive behavior in general is very extensive, yet fewer studies focused on such differences in driving. In driving, aggression can be honking, crossing red lights, driving close to a lead vehicle, exceeding speed limits, cutting across one or more lanes in front of other vehicles, etc. (Shinar & Compton,