The driver behaviour questionnaire in South-East Europe countries: Bulgaria, Romania and Serbia

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ABSTRACT

Using data from three samples and more than 1000 participants, this study have examined the psychometric properties of the Driver Behaviour Questionnaire (DBQ) in three countries from South-East Europe. Differences in driving behaviour between countries were also investigated. Exploratory factor analysis results supported the distinction between errors and violations in all three countries. Furthermore, the positive associations of both errors and violations with self-reported traffic accidents were also consistent in all three samples. In terms of differences in driving behaviour, Romanian drivers scored higher on many error and violation items in comparison to the other two countries. Also, speeding violations were the most common violations in all three countries. Overall, our results provide further support for using the DBQ to measure aberrant (i.e. errors and violations) driver behaviour.

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1. Introduction

The problem of safety in road traffic represents a major challenge at a global level. More than 1.24 million people are killed on the world's roads each year, with low and middle-income countries bearing a disproportionate burden (WHO, 2013). Even within Europe there are regional differences. Compared to west European countries, countries in South-East Europe have higher road accident fatality rate. For example, in 2012 Bulgaria had 8.2, Romania 9.6 and Serbia 9.6 road traffic fatalities per 100.000 inhabitants, whereas the corresponding ratios for the United Kingdom, the Netherlands and Germany were 2.8, 3.2, and 4.4, respectively (European Commission, 2013; RTSA, Serbia, 2013). These differences can to some extent be explained by differences in economic, societal, and cultural factors (Özkan & Lajunen, 2011).

Driving behaviour can be assumed to reflect socio-economic differences in traffic safety. It was reported that, for example, that drivers in Western/Northern European countries scored higher on ordinary violations, whereas drivers in Southern/Middle Eastern European countries had higher scores on driving errors and aggressive driving (Özkan, Lajunen, Chliaoutakis, Parker, & Summala, 2006). Authors suggested that the higher level of aggressive driving and errors of drivers in these countries was due to higher levels of conflict attributed to less developed infrastructure, less respect for traffic rules and higher levels of driver stress. Also, it was claimed that the concept of being a "safe driver" depends on culture and, therefore, understood differently in different countries. Another study showed that Finnish and Swedish drivers reported aggressive viola-

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tions and ordinary violations (with speeding being the exception) less frequently than Greek and Turkish drivers (Warner, Özkan, Lajunen, & Tzamalouka, 2011).

Driving performance is associated with driving skills and driving style is associated with driver behaviours. Driving skills include information processing and motor skills, which improve with practice and training (i.e. with driving experience). Driving style concerns individual driving habits-that is, the way a driver chooses to drive (Lajunen & Özkan, 2011). The Driver Behaviour Questionnaire (DBQ) (Reason, Manstead, Stradling, Baxter, & Campbell, 1990) is one of the most widely used instruments for measuring driving style. Reason et al. (1990) found that driving errors and violations are two empirically distinct classes of behaviour containing three factors: *violations, errors* and *slips and lapses*. They defined violations as "deliberate deviations from those practices believed necessary to maintain the safe operation of a potentially hazardous system" and errors as "the failure of planned actions to achieve their intended consequences". Reason et al. (1990) also found a third DBQ factor, which they named "slips and lapses". This factor included attention and memory failures, which can cause embarrassment but are unlikely to have an impact on driving safety. Violations refer to behaviours such as "close following, speeding, risky overtaking". Errors refer to behaviours such as "failing to notice pedestrians crossing, miss "Give Way" signs and narrowly avoid colliding". Lastly, slips and lapses refer to behaviours such as "attempt to drive away from the traffic lights in third gear, forgetting where one's car is parked". Later, Lawton, Parker, Manstead, and Stradling (1997) found that the original violations could be divided into interpersonally aggressive violations, containing an interpersonally aggressive component and ordinary violations, which are deliberate deviations from the highway code without a specifically aggressive aim.

Since its development, there have been a several alternative solutions on the original factor structure of the DBQ. The DBQ is most commonly assumed to measure from two to four latent variables, though the number of extracted factors has varied from two to seven. It was suggested that age, gender, socio-economic and cultural differences could have caused the dissimilarities in factor structures (Blockey & Hartley, 1995; Reason, 1990; Reason et al., 1990; Özkan, Lajunen, Chliaoutakis, Parker, & Summala, 2006). This leads to scientific discussion about the most applicable factor solutions of the DBQ (see de Winter, 2013; Martinussen, Hakamies-Blomqvist, Møller, Özkan, & Lajunen, 2013; Mattsson, 2012, 2014). The main distinction between errors and violations seems to be the most stable in all studies, despite some dissimilarity in factor structures (Özkan, Lajunen, Chliaoutakis, et al., 2006). Lajunen, Parker, and Summala (2004) studied the DBQ factor structure among British, Dutch, and Finnish drivers. The results of this study supported the idea of two second-order factors, named errors and violations. In the follow-up study by Özkan, Lajunen, and Summala (2006), the two-factor solution emerged as the most applicable and stable one over three years follow-up period among possible factor solutions of the DBQ. Furthermore, Warner et al. (2011) showed that the two-factor solution including errors (errors and lapses) and violations (aggressive and ordinary violations) was fairly stable over the four countries (Greece, Finland, Sweden and Turkey), even though three of the ordinary violation items and two of the lapses items had their highest loading on different factors in different countries. However, evidence that supports the application of a four-factor solution should not be disregarded (e.g. Martinussen et al., 2013; Mattsson, 2012).

One of the most important applications of the DBQ is the prediction of individual differences in accident involvement. Most of the studies showed that violations were positively correlated with traffic accidents (e.g. Gras et al., 2006; Parker, Reason, Manstead, & Stradling, 1995; Parker, West, Stradling, & Manstead, 1995; Rimmö & Åberg, 1999; Özkan & Lajunen, 2005; Özkan, Lajunen, Chliaoutakis, et al., 2006; Kontogiannis, Kossiavelou, & Marmaras, 2002). However, results about errors and lapses are not so clear. Several studies showed that there are positively correlations between errors and traffic accidents (e.g. Bener, Özkan, & Lajunen, 2008; Guého, Granie, & Abric, 2014; Rimmö & Åberg, 1999; Sümer, 2003, regarding Qatar but not in United Arab Emirates), while in other studies those correlations were not found (e.g. Gras et al., 2006; Kontogiannis et al., 2002; Parker, Reason, et al., 1995; Özkan, Lajunen, Chliaoutakis, et al., 2006, regarding all countries in the study except for Turkey). However, Wåhlberg, Dorn, and Kline (2011) noticed that in the literature "errors and lapses, taken together, have been significant predictors of accidents about as many times as the various violation factors" (p. 12). Also, a meta-analysis by de Winter and Dodou (2010) showed that errors and violations are about equally strongly related to self-reported accidents.

In spite of the fact that South-East Europe countries have higher road accident fatality rate compared to west European countries, there is a relatively small number of driving behaviour researches in this region. The validation of questionnaires which measures driver's behaviour can contribute to the better comprehension of problem and give us some guidelines for implementation of appropriate measures. The aim of the present study is to investigate the factor structure of the DBQ and to identify differences in tendency to commit aberrant driving behaviours between the three countries in South-East Europe: Bulgaria, Romania and Serbia. Finally, we also examined the relationships between the factors of the DBQ, background variables, and accident involvement.

2. Methods

2.1. Participants and procedure

The Bulgarian and Romanian data were collected by using the snowball sampling technique (Goodman, 1961). Students of Faculty of Transport in Bulgaria, and Psychology students in Romania delivered the questionnaire (in paper-pencil or