Available online at www.sciencedirect.com
SCIENCE DIRECT®
Transportation Research Part F 9 (2006) 227–242
TRANSPORTATION RESEARCH PART F
www.elsevier.com/locate/trf

Cross-cultural differences in driving behaviours: A comparison of six countries

Türker Özkan [a], Timo Lajunen [b,*], Joannes El. Chliaoutakis [c], Dianne Parker [d], Heikki Summala [a]

[a] *Traffic Research Unit, Department of Psychology, P.O. Box 9, University of Helsinki, 00014 Helsinki, Finland*
[b] *Safety Research Unit, Department of Psychology, Middle East Technical University (ODTÜ), Ankara, Turkey*
[c] *Department of Social Work, Technological Educational Institute (TEI) of Crete, Heraklion, Greece*
[d] *Department of Psychology, University of Manchester, UK*

Received 24 July 2005; received in revised form 5 December 2005; accepted 5 January 2006

Abstract

The first aim of the present study was to investigate the applicability of the three-factor structure (aggressive violations, ordinary violations, and errors) of the Manchester Driver Behaviour Questionnaire (DBQ) and then to compare these driving behaviours across the six countries (Finland, Great Britain, Greece, Iran, The Netherlands, and Turkey). The third aim of the present study was to evaluate the role of driving styles in the relationship between traffic cultures (countries) and the number of traffic accidents utilizing a mediational framework. The fourth aim of this paper was to investigate the relationship between the three factors of DBQ and the number of traffic accidents in each country. Two hundred and forty-two drivers were chosen from each of the six countries, matched for age and sex. The results of confirmatory factor analyses showed that the fit of the three-factor model of DBQ was partially satisfactory in each country. Exploratory factor analyses together with target (Procrustes) rotation and factorial agreement indexes showed that the "ordinary violations" factor was fully congruent and the "errors" factor was fairly congruent across countries. Reliabilities of the scales were at the same level as in the original British data. ANOVA results revealed differences between drivers from "safe" Western/Northern European and Southern European/Middle Eastern countries on DBQ items and scales. Results demonstrated that driving style mediates the relationship between traffic culture (i.e. country) and the number of accidents. Poisson and negative binomial regression analyses also showed that the importance of driver characteristics and behaviours in predicting the number of traffic accidents varies from country to country.

Keywords: Driver behaviours; Cross-cultural differences; Regional differences; Traffic accidents; Mediational model

* Corresponding author. Tel.: + 90 312 2105113; fax: + 90 312 2101288.
E-mail address: timo@metu.edu.tr (T. Lajunen).

1369-8478/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.trf.2006.01.002

1. Introduction

It has been estimated that annually two million people die worldwide in road traffic accidents. In addition to human misery and suffering, the total cost of road accidents, including the economic value of lost quality of life, has ranged from 0.5% to 5.7% of GNP of countries (Elvik, 2000). Although road traffic accidents are a large problem everywhere, there are considerable regional differences between countries. In 2001, 9.1 Finns, 8.9 Dutch, and 7.5 Britons per 1 billion vehicle-kilometer were killed in traffic accidents whereas the corresponding figures for Turks and Greeks were 73 and 26.7, respectively (IRTAD, 2003). Despite this inequality between Southern and Western Europe, the reasons for different accident risk figures have remained mainly unexamined.

Most road traffic accidents can be directly attributed to human factors as a sole or a contributory factor (Lewin, 1982). Human factors in driving can be seen as being composed of two separate components: driving skills and driving style or, in other words, driver performance and behaviour (Elander, West, & French, 1993; Evans, 1991; Näätänen & Summala, 1976). Driving skills include information processing and motor skills, which improve with practice and training, i.e. with driving experience. Driving style refers to the ways drivers choose to drive or habitually drive, including, for example, the choice of driving speed, habitual level of general attentiveness, and gap acceptance (Elander et al., 1993). Because of the evident relevance of driving style to accident risk, dozens of self-report instruments have been developed for measuring driving style.

1.1. The Driver Behaviour Questionnaire (DBQ) and its theoretical basis

The Driver Behaviour Questionnaire (DBQ) (Reason, Manstead, Stradling, Baxter, & Campbell, 1990) is one of the most widely used instruments for measuring driving style. The DBQ is based on a theoretical taxonomy of aberrant behaviours (Reason, 1990) and the main idea in the DBQ being the distinction between errors and violations (Reason et al., 1990). Errors were defined as "generic term to encompass all those occasions in which a planned sequence of mental or physical activities fails to achieve its intended outcome, and when these failures cannot be attributed to the intervention of some chance agency" (Reason, 1990, p. 9). Hence, errors are unwanted results of involuntary actions whereas violations are based on conscious deviation from a rule or safe practice. Errors were further divided into slips and lapses (resulting from action) and mistakes (errors of intention). Slips (attention deficits) and lapses (memory failures) are results of cognitive processing problems.

Mistakes were further divided into two subcategories, which were based on Rasmussen's "skill-rule-knowledge" taxonomy of human performance levels (for comprehensive review see Rasmussen, 1980): rule-based mistakes and knowledge-based mistakes (Reason, 1999). Violations can be located in the "rule-based mistakes" category. They can be associated with the misapplication of normally good rules, the application of bad rules, a failure to apply a good rule, or erroneous performance in a no-rules situation. A further distinction has been suggested between two kinds of violations according to the reason why drivers violate (Lawton, Parker, Manstead, & Stradling, 1997). The first violation type, named as ordinary violations, involves deliberate breaking the Highway Code (e.g., speeding). The second violation type involves overtly aggressive acts (e.g., showing hostility by chasing other vehicles). In this way, contextual and motivational demands influence violations. Errors can be located in the "knowledge-based mistakes" category. They emerge when pre-existing solutions do not work and a trial-and-error learning process is needed for finding new feasible solutions (see Reason, 1999).

1.2. Factor solutions of the DBQ in empirical studies

In their first study about DBQ, Reason et al. (1990) found that driver errors and violations are two empirically distinct classes of behaviour containing three factors (deliberate violations, dangerous errors, and 'silly' errors). Later, Parker, Reason, Manstead, and Stradling (1995) confirmed the three-factor structure of the DBQ. Åberg and Rimmö (1998) re-confirmed the three-factor solution with 44 of the 50 original items in their study conducted in Sweden. In contrast to the British and Swedish results, Blockey and Hartley (1995) could not find the same three-factor solution in Australia and, consequently, named their DBQ factors differently as