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Validation of selected temperament and personality questionnaires for diagnosing drivers' aptitude for safe driving. A Polish study

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ABSTRACT

This paper presents the results of a study aimed at validating psychological questionnaires evaluating temperamental and personality features. It discusses their usefulness in diagnosing drivers' aptitude for safe driving and working as professional drivers. Three psychological questionnaires were validated: the Formal Characteristics of Behaviour – Temperament Inventory (FCB-TI), the Eysenck Personality Questionnaire – Revised and Short Scale (EPQ-R (S)) and the Impulsiveness Questionnaire (IVE). Three groups of drivers ($n = 246$) aged 19–75 participated in the study. Group I (professional drivers; $n = 96$) and Group II (nonprofessional drivers; $n = 75$) had never been involved in road crashes, whereas Group III (nonprofessional drivers; $n = 75$) were offenders involved in fatal injury road crashes. Criterion-related validity, Cronbach's alpha and Guttman split-half reliability coefficient were in assessing the psychometric properties of the questionnaires. There were some significant differences between Groups II and III for most traits. However, contrary to expectations, higher Emotional Reactivity, Perseveration and lower Endurance as well as higher Neuroticism, Impulsiveness and Venturesomeness were determined for Group II than for Group III. Additionally, the temperament and personality profile of Group II turned out to be less fitted to the profile of safe drivers than that of Group III, whose profile was actually similar to that of Group I. This seems to result from a high tendency for a positive self-presentation among Group I and Group III (a significantly higher result on the Lie scale in comparison with Group II). The results suggest that if psychological tests are to decide on whether a person may be a professional driver or may drive vehicles, the three questionnaires (FCB-TI, EPQ-R(S) and IVE) do not provide a valid diagnosis of professional drivers' aptitude because of drivers' high tendency for positive self-presentation. However, they can be used in job counselling and in screening high-risk drivers.

1. Introduction

Diagnosis and certification of driving aptitude of both nonprofessional and professional drivers as well as selection for the job are particularly important in the field of transport and traffic. This is so because road transport is considered to be one of the most dangerous economic sectors with respect to the number of road crashes, and one of the most cost-consuming means of transport for social reasons (EU Strategy, 2007–2012). Poland has been a leader in road fatalities in Europe for many years. In 2012, the road crash severity rate in Poland was 10 deaths per 100 crashes, whereas it was just over 3 fatalities per 100 crashes in the European Union (Zielińska, 2013). In 2011, the cost of road crashes in Poland accounted for about 1.3% of GDP (Jaździk-Osmólska, 2012). In the same year, professional drivers in Poland caused 8.7% of road crashes, they were the third largest occupational group with respect to accidents at work (10%).

Practice shows that making driving accessible solely to persons with a certain aptitude is highly effective in lowering the risk of human error and, what follows, road transport crashes. At the European level, the Council Directive of 29 July 1991 on driving licences (91/439/EEC) takes up this issue. Psychological testing for drivers to diagnose their aptitude for safe driving is a possibility. In Poland, under the Motor Vehicle Drivers' Act (Ustawa o kierujących pojazdami, 2011), psychological testing is obligatory for professional drivers and, in some cases, nonprofessional ones

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(after drunk- or drug-driving, after scoring over 24 penalty points or after being involved in a road crash).

Reliable psychological diagnostics requires, as a prerequisite, a methodology that meets precisely defined standards for the quality of psychological tests (Standards, 1999). The usefulness of tests in psychological examinations of drivers is based on various factors, including their *criterion-related validity* and, in particular, one of its types, *concurrent validity*, which makes it possible to certify whether drivers have an aptitude for driving. The validity of psychological tests used in psychology and road traffic is a key factor in deciding about their usefulness in terms of lowering the risk of road crashes.

1.1. Temperament and personality factors, and road crashes

Most studies on the causes of road crashes focus on the relationship between specific traits and abilities of drivers, and crash risk. The personality factors most often selected for that purpose include the Big Five personality dimensions. High *Extraversion*, low *Conscientiousness* and low *Agreeableness* (Arthur and Graziano, 1996; Clarke and Robertson, 2005) are most often considered accurate predictors of crashes. However, study results are not always unambiguous. Some showed that *Extraversion* correlated positively with the number of heavy road crashes, whereas *Neuroticism* correlated negatively (Lajunen, 2001). Others showed that high *Neuroticism*, along with high *Extraversion*, low *Conscientiousness* and low *Agreeableness*, were related to crash risk, but only indirectly, as those traits had a direct impact on aberrant behaviour as measured with the *Driver Behaviour Questionnaire* (DBQ) (Sümer et al., 2005). Similarly, Taubman-Ben-Ari and Yehiel (2012) proved a direct link between personality factors and a specific type of driving behaviour. High *Neuroticism*, low *Agreeableness* and low *Conscientiousness* characterised drivers admitting to a reckless and aggressive driving style. For those drivers, driving involved such benefits as a sense of power and control over a situation, and pleasure and thrill seeking, whereas costs were defined in terms of danger and a threat to life, potential problems, irritation and possible damage to one's personal image.

Locus of control (which here also applies to control in traffic) is another predictor of crashes and mistakes made while driving (Montag and Comrey, 1987; Özkan and Lajunen, 2005). At the same time, *controllability awareness* turned out to be a variable that significantly differentiated offending drivers from non-offending ones. Offending drivers found distinguishing between situations under and out of their control a problem. Possibly that is why they evaluated all requirements as threats rather than challenges. Moreover, offending drivers were characterised by a significantly worse mood (higher anxiety, depression, tiredness, confusion, diminished vitality) and substantially more indirect forms of aggression than non-offending drivers (Sanval et al., 2012). However, Sümer's (2003) study on professional and nonprofessional drivers (where the number of road crashes in which the drivers had been involved during the previous 3 years was used as a control) showed that such psychological symptoms as depression and anxiety, as well as hostility and psychoticism, had a rather indirect impact on road crashes through their effect on drivers' aberrant behaviour as measured with the DBQ. *Sensation seeking* had a direct impact only on speed driving, and not on road crashes, and *aggression* directly predicted dysfunctional drinking (drinking and driving, or antisocial behaviour after drinking).

There is a link between road crashes and *aggression* and *violations* in road traffic, as expressed in *negativism, irritation* and *verbal and physical hostility* (Li et al., 2004; Nabi et al., 2005, 2006). One of the first studies to analyse aggression on the road compared two groups of taxi drivers, who had caused a different number of crashes; it showed that drivers with more road crashes displayed a larger share of socially unacceptable behaviours and had more frequent contact with the police and courts (Tillman and Hobbs, 1949). Moreover, *risk-taking propensity*, expressed in such behaviours as driving to relieve stress or racing other cars involving speed driving, were valid predictors of involvement in road crashes (Ivers et al., 2009; Patil et al., 2006).

Type A behaviour pattern (Nabi et al., 2005) is closely related to the number of serious road crashes. One of its aspects, *always being in a hurry and under time pressure*, was discovered to be significantly connected with the number of near crashes (Karlberg et al., 1998).

Other studies of professional drivers showed a link between temperament and general perceived and traffic-related stress (Waszkowska, 2009). The level of traffic-related stress was lowest in persons with a higher ability to process stimulation and act under long-term or strong stimulation (high *Briskness*), lower sensitivity to emotional stimuli (low *Emotional reactivity*), lower tendency to repeat a reaction to a stimulus that was no longer there (low *Perseveration*) and a higher tendency for behaviours marked by high stimulation value (high *Activity*).

Studies also showed that certain configurations of temperament and personality factors could constitute a special road crash risk factor, for example, a tendency to perceive various events as potentially bothersome (high *Perseveration* and low *Endurance*) (Trzcińska, 1996), an emotional style of coping with stress (high *Emotional reactivity* and high *Perseveration*) (Strelau et al., 2005) and a nonintegrated personality (low *Neuroticism* coexisting with high *Extraversion* and high *Lie*) (Aneks, 2003).

1.2. The validity of personality questionnaires

The results of studies on the validity of personality questionnaire are ambiguous. A review of studies (1952–1963) on the validity of personality questionnaires in job selection, which considered 14 measures, showed quite high criterion-related validity. The values of correlation coefficients between some of the scales at the analysed inventories and external criteria were between .15 for executives in the Guilford-Martin Personnel Inventory and .55 for engineers in Gough's California Psychological Inventory (Guion and Gottier, 1965). But a meta-analysis of 117 studies (1952–1988) on criterion-related validity of the Big Five personality dimensions conducted from the point of view of their usability in job selection indicated that the average correlations between personality features and the criterions of job selection (job proficiency, training proficiency and personnel data) were low, for example, .07–.22 for *Conscientiousness* (Barric and Mount, 1991). Also Friedman and Booth-Kewley (1987) showed that the predictive validity of personality features for evaluating incidence of psychosomatic disorders was low (.1–.2). Similarly, an analysis of 494 studies indicated poor correlations between several dozen personality scales and job performance indicators (.29 and .12, depending on the method) (Tett et al., 1991), whereas Pasquier and Mazilescu's (2009) study on the predictive validity of a five-factor model in evaluating students' achievements showed that only *Harshness*, the opposite of *Agreeableness*, correlated significantly with students' grades (−.19), although the strength of this relation expressed with the value of Cohen's *d* (.39) was poor. An attempt to estimate construct validity on the basis of the relationship between psychophysical and psychophysiological indicators (e.g., electrical brain activity, event-related potentials, time and strength of motor reaction, speed of conditioning) and extraversion, neuroticism as well as sensation seeking produced divergent results. According to Strelau (1998), this is so because of the differences in the quality of the indicators. Guion and Gottier (1965) suggested that there was no hard evidence that personality questionnaires could be recommended as a good measure in job selection. They also say that "the validity of any personality measure must be specifically and competently