Pedestrian behaviours: Validation of the Serbian version of the pedestrian behaviour scale

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ABSTRACT

Statistics show that each year a great number of pedestrians in Serbia are killed in traffic accidents. The purpose of this paper is to determine the frequency of some risky behaviours of pedestrians in traffic in Serbia. The current version of Pedestrian Behaviour Scale (PBS) was conducted among the participants in Serbia, but it was also improved by the addition of questions concerning the use of mobile phones while crossing the street. The questions were divided into 5 characteristic separate groups (violations, errors, lapses, aggressive and positive behaviours), confirmed by factor analyses. The results shown that pedestrians in Serbia distinguish between violations, errors and lapses, which in the studies conducted to date in other countries was not the case. The greatest number of violations in Serbia is made by young persons and persons who walk by necessity, while persons who walk for pleasure and who walk the shortest distances show the biggest number of lapses. The oldest persons and females generally showed positive behaviours to other road users, while the increase of daily distances walked led to the increase of errors and positive behaviours.

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1. Introduction

Road safety depends on the behaviour of all road users, who are influenced by their attitudes. Therefore, the knowledge of pedestrians' attitudes and behaviour can help to understand the needs of this group of road users (Yannis, Golias, & Papadimitriou, 2007). This is particularly significant for policy measures in the process of improving road safety in a particular local community.

Traffic accidents involving pedestrians most frequently happen when pedestrians cross the street. For example, in the USA, during a three-year period, 63% of the traffic accidents including pedestrians happened while the pedestrian was crossing the street (Da Silva, Smith, & Najm, 2003). The behaviour of both pedestrians and drivers can lead to an accident involving pedestrians. A study (Bungum, Day, & Henry, 2005) showed that around 15% of the pedestrians were killed in traffic accidents due to the negligence of pedestrians.

Various studies have examined road users' social attitudes and behaviour, out of which several (Assum, 1997; Louka, Yannis, & Kanellaidis, 2004; Papadimitriou, Theofilatos, & Yannis, 2013; Vanlaar & Yannis, 2006) were based on the SARTRE 1-4 (Social Attitudes to Road Traffic Risk in Europe) research projects and aimed to analyse social attitudes and behaviour towards risk in road traffic in Europe by means of questionnaires and personal interviews. The results of this research have

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shown that positive attitudes of all road users largely reduce the risk of involvement in traffic accidents. Positive attitudes are shown by the pedestrians who have expressed their satisfaction with the traffic environment, were not annoyed by the other road users, agree with reinforcement, traffic rules, in-vehicle devices and have careful behaviours (Papadimitriou et al., 2013). The influence of gender on attitudes has shown that women show significantly more positive attitudes than men, while the ratio between correct attitudes and age is positive among all road users in Europe.

Characteristics and personality traits are associated with differences in the behaviour of pedestrians when crossing the street. A research that was based on the theory of planned behaviour, and which measured the tendency towards social conformity (Zhou, Horrey, & Yu, 2009) showed that subjective norms, perceived risk, self-identity and perceived behavioural control were positively associated with crossing the street in potentially dangerous situations. Several studies, conducted worldwide, have examined gender and age differences in pedestrian behaviour. Male pedestrians tend to violate traffic rules more frequently than females and are more likely to cross in risky situations (Moyano Díaz, 2002; Rosenbloom, Nemrodov, & Barkan, 2004). Generally, young adults and adolescent pedestrians are more likely to commit violations than older pedestrians (Moyano Díaz, 2002), and older road users express more appreciation for controlled pedestrian crossings and signalized intersections than younger pedestrians do (Bernhoft & Carstensen, 2008). Therefore, understanding pedestrian behaviours when crossing remains a road safety challenge (Evans & Norman, 2003).

A self-report study which measured pedestrian behaviour was developed by several authors and was confirmed in their countries. Moyano Díaz (1997) developed Pedestrian Behaviour Questionnaire PBQ in Chile. This tool made a difference between violations, errors and lapses. After that, Yildirim (2007) developed a version of this tool in Turkey, differentiating between violations, aggressive behaviours and errors. In both cases, the results showed that more violations were made by men. Furthermore, more errors were noticed among young pedestrians (17–25 years) than among older pedestrians (25–49 years). In contrast to them, Granié, Pannetier, and Guého (2013) developed a Pedestrian Behaviour Scale PBS in France. This study validated the PBS for all ages, and made a difference between violations, errors and lapses, and also provided an understanding of aggressive and positive behaviours by pedestrians towards other road users.

In 2014 in Serbia 128 pedestrians were killed in traffic accidents, which makes 23.9% of all fatalities. In the same year the total number of injured pedestrians was 2827. In 1033 traffic accidents that occurred in 2014, it was pedestrians who were responsible for the occurrence of traffic accidents (Road Traffic Safety Agency, 2015). Bearing this in mind, the aim of this study is to obtain knowledge on pedestrian behaviours in Serbia, and to identify the differences in pedestrian behaviour comparing them by gender, age groups, reasons for walking and daily distances walked. Of course, it is necessary to validate a Serbian version of the Pedestrian Behaviour Scale (PBS), because until now these tools have not been used to evaluate the behaviour of pedestrians in our country.

The Serbian version of the Pedestrian Behaviour Scale (PBS) suggests questions about the use of mobile phones while crossing the street. The reason for the introduction of these questions is reflected in the fact that one of the pedestrians' problems in terms of traffic safety is mobile phone use while crossing the street, as Hatfield and Murphy (2007) and Nasar, Hecht, and Wener (2008) confirmed in their studies. The results of a study conducted in Serbia showed that the mobile phone use at unsignalized intersections was 11.5%, while the mobile phone use at signalized intersections was 13.4% (Milenković, Maslać, & Trifunović, 2014). These data clearly indicate the necessity of introducing the questions related to the use of mobile phones while crossing the street, which was made in the Serbian version of the Pedestrian Behaviour Scale (PBS).

2. Material and methods

The questionnaire conducted in Serbia was based on the already confirmed version of Pedestrian Behaviour Scales (PBS) (Granié, 2008; Granié et al., 2013) conducted in France. This version represents the unified whole of all previous tools which were used for measuring the behaviour of pedestrians (Moyano Díaz, 1997; Torquato & Bianchi, 2010; Yildirim, 2007) conducted in Chile, Brazil, Turkey. The Serbian version of the Pedestrian Behaviour Scale (PBS), in addition to conducting questionnaires among the Serbian population, introduces an innovation related to the use of mobile phones by pedestrians when crossing the street.

In Serbia, on the basis of the Law on the Road Traffic Safety, Article 96 (paragraph 2) was defined and reads as follows: "When crossing the street pedestrians must not use a mobile phone or use the headset on their ears". Bearing this in mind, the questions related to mobile phone use while pedestrians are crossing the street are grouped with violations. The questions refer to talking on mobile phones, reading the contents (text messages, the Internet) and listening to music.

The method of collecting the data was a questionnaire filled in by 415 participants. The questionnaires were distributed to random pedestrians at several locations in Serbia. Items were presented in random order to avoid bias in participants' answers.

The questionnaire had two parts. The first part contained the questions about the social and demographic characteristics (gender, age, education), and the questions about the most frequent reasons for walking, the daily distance that a pedestrian walked, the possession of driving licence and participation in traffic accidents. All the questions were closed-type and participants circled one of the given answers.

The second part of the questionnaire was about the attitudes and behaviour of pedestrians in traffic, and it contained twenty questions presented in Table 1, divided into five groups (violations, errors, lapses, aggressive behaviour and positive behaviour). The first group contained the questions about violations in traffic. A violation was defined as an intentional