Pedestrians' behaviours: errors, violations and lapses

Renata Jucksch Torquato, Alessandra Sant'Anna Bianchi

Federal University of Paraná (UFPR), Brazil.
Traffic Psychology Laboratory (NPT),
Praça Santos Andrade, 50 2o. Andar. 80060-000 Curitiba - PR –Brazil
renata84@gmail.com, bianchi@acm.org

Abstract

Traffic accidents have become a huge problem for the authorities due to its incidence and costs. Amongst the users of the traffic system, the pedestrian is most vulnerable being more exposed to the dangers of traffic. While efforts have been made to reduce the number of accidents involving drivers, few studies have been carried through on the behavior of the pedestrian in Brazil. 210 university students had been invited to answer a questionnaire about their behavior as pedestrians. Differences between the groups age and sex were observed. Young people reports to commit more violations and errors than the adults. Men commit more violations then women. Contemplating these data specific strategies for the different groups are suggested focusing the responsibility of the pedestrians for their behaviors in the traffic.

1. Introduction

1.1 Context

Every year more than 1.2 million people die due traffic accidents especially in the developing countries (Toroyan & Peden, 2007). While these rates are decreasing in the developed countries, the developing countries struggle with large number of deaths and disabilities costing approximate 1 to 2% of all gross national product (GNP) (Söderlund & Zwi, 1995; Toroyan & Peden, 2007). The majority of road deaths are amongst pedestrians, cyclist and motorcyclists, the most vulnerable road users.

Traffic in Brazil is considered one of the worst and more dangerous in the world (Marin & Queiroz, 2000). The reasons are diverse, such as raise of the number of vehicles, growth of the urban population and the lack of a culture directed towards safety (Waksman & Pirito, 2005).

According to the Traffic Accidents Statistic Bureau (RENAEST, 2007), in 2006, there were 322,919 traffic accidents with victims in Brazil. Among those, 52,965 were pedestrians. More than 10,261 pedestrians were killed per year, being 28.7% of the amount of the traffic deaths (Mello Jorge & Koizumi, 2007; IPEA/MPOG, DENATRAN & ANTP, 2006). However, these numbers need to be taken as lower bound values since the data collection is rudimentary and in some cases missing (Mello Jorge & Latorre, 1994; Velloso & Jacques, 2005; RENAEST, 2007).

Miranda & Cabral (2003) observe that the cities in Brazil are not designed for pedestrians. The main purpose of planning is to guarantee the car traffic flow (Daros, 1998), relegating pedestrians as second class road users (Miranda & Cabral, 2003). This is a worldwide condition, especially in the developing countries (Peden et al., 2004; Toroyan & Peden, 2007).

Signal regulation, such as pelican and zebra crossing, reduces the personal injuries accidents ca. 5 -10%, but in the area up to 50 meters from those signals there is a propensity that the number of pedestrian accidents increased slightly (Elvik, et al., 1997). To keep pedestrians away from the roads with high collision risk, some strategies are used. There are two kinds of devices: barriers that hinder the cross behaviour like fences and obstacles, and alternative way to cross the road away from contact with the traffic like footbridge and passageway. However, bad planning such long distance between bus stops and footbridges and poor maintenance work as an unappealing choice, possibly leading pedestrians to cross the road in the wrong way (Miranda & Cabral, 2003).

Some risk factors are considered in traffic accidents. About gender, men seem to be more involved in traffic accidents because in general men die more than women (Toroyan & Peden, 2007) and commit more traffic violations than women (as pedestrian see Moyano-Diaz, 1997; as driver see Bianchi & Summala, 2002). In 2004, 7,825 men pedestrian died due traffic accident, while just 2,337 women died (Mello Jorge & Koizumi, 2007). Age is also a relevant factor concerning death rates in traffic. Between all pedestrian victims in Brazil in 2004, 50.6% had less than 10 years, and 61.5% of all accidents involving elderly pedestrians resulted in death (Mello Jorge & Koizumi, 2007).

Although there are statistics that highlighted the conditions of risk, in Brazil there are few studies that seek to understand the causes of accidents among pedestrians (Cardoso et al., 2003). This lack of knowledge affects the possibility of the government do something effective to avoid the increase of deaths and injured in traffic (Velloso & Jacques, 2005), especially among those vulnerable road users.

This study proposes to enlarge the understanding of pedestrian behaviour in Brazil and suggests different approaches in interventions directed to different groups (e.g., age, gender, driver and pedestrian).

1.2 The pedestrian and the law

According to the Brazilian Traffic Law (Código de Trânsito Brasileiro, 1997), pedestrians are part of the transit, and have rights and duties. Thus, the law prohibits behaviours that could lead to a collision or that could hinder vehicle flow (article 69) and characterizes the violations that pedestrians could do (article 254). The transgressions executed by pedestrian are liable to fees, although this aspect of law is not followed and the traffic agents consider this control impossible (Cardoso et al., 2003).

Reason et al. (1990) divided human risk behaviour in errors and violations, and developed a Driver Behaviour Questionnaire (DBQ) to measure these concepts among drivers. The transgressions can be defined as deliberate actions to infringe the rules such as exceeding the speed limit or close driving. They are associated with the attitudes and motivations (Rimmö & Åberg, 1999) and are influenced by social context (Reason, et al., 1990). The errors are failure of planned actions to achieve their intended consequences and are unintentional, such as braking too quickly on slippery road. Errors are associated with individual cognitive processes (Reason et al., 1990). Lapses are memory and attention problems, including behaviours such as forgetting where the car is parked or using the wrong gear of the car. They only cause embarrassment and inconvenience.

Distinctions between transgressions, errors and lapses between drivers have been examined in previous studies (Reason, et al., 1990; Rimmö & Åberg, 1999; Bianchi & Summala, 2002;

Lajunen et al., 2004; Özkan et al., 2006). They highlight the importance of distinction between errors, violation and lapses to develop instruments for diagnosis and to provide education or therapy with specific goals (Rocha, 2005).

Studies have shown that men and young drivers commit more transgressions than women while women reported committing more lapses (Reason, et al., 1990; Rimma & Åberg, 1999; Bianchi & Summala, 2002; Özkan et al., 2006). Older drivers commit fewer violations but more errors and it seems that inattention errors increase with age (Özkan et al., 2006).

Those who consider themselves good drivers commit more violations (Reason, et al., 1990) and also those who drive frequently (Özkan et al., 2006).

The DBQ was developed to investigate driver behaviour, but it has been used as framework to design instruments to investigate other traffic user's behaviours such as motorcyclist (Elliot et al., 2007) and pedestrians (Moyano-Diaz, 1997; Moyano-Diaz, 2002).

Elliot et al. (2007) developed a Motorcycle Rider Behaviour Questionnaire (MRBQ), consisting of 43 items to measure the self-reported frequency of specific riding behaviour and test which types of behaviour predict motorcyclists' crash risk. The MRBQ was submitted to a sample of 8,666 motorcyclists and it was found that traffic errors were the main predictors of crash risk.

Moyano-Diaz (1997) developed a questionnaire of pedestrian and traffic behavior (PBQ) consisting of 16 five-point Likert type items and found similar results. Men reported committing more transgressions than women, as young people commit more transgressions than adults. Errors and lapses did not show significant differences between gender and age (Moyano-Diaz, 1997; Moyano-Diaz, 2002).

In Brazil, there is lack of studies concerning pedestrian behaviour and the risk factors (Velloso & Jacques, 2005; Cardoso et al., 2003), contrasting with the high number of pedestrians fatalities. Although the publication of the Brazilian Traffic Law and its specific component concerning the pedestrians behaviours and some isolated educational campaigns in 1997, most knowledge is based on foreign experience without sufficient studies of local needs or an adjustment to that reality in order to define the targeted intervention efforts (Faria & Braga, 2003). It is only through studies about the Brazilian reality that suitable interventions could be created and a new culture in traffic that support public policies to decrease the pedestrian's fatalities developed (Cardoso et al., 2003; Marin & Queiroz, 2000).

2. Methodology

2.1 Participants and Procedures

210 students from the city of Curitiba (Brazil) were invited to participate in the study which was 75.20% females, ages ranging from 17 to 49 (mean = 20.59 years, SD = 4.54). 40.5% had a driving license (CHN) and 58.7% drive less than four hours per week. The mean period of possession of a drivers license ranged from 1 month to 23 years (mean = 37.72 months, SD = 57.74). Participants reported that they spent 1 to 16 hours per week as pedestrians (mean = 0.62 hours, SD = 4.70), but 50.6% were pedestrians less than four hours per week.

The students were invited to participate in the study period of class. Questions concerning ethics of research involving human subjects were included in the consent that explained the purpose of research and guarantee the confidentiality of data. Following this procedure the subjects answered the questionnaire.

2.2 Materials

In the current study the Pedestrians' Behaviour Questionnaire (PBQ), developed by Moyano Diaz (1997) in Chile, was translated into Portuguese. After translation from Spanish to Portuguese, a second bilingual person did a back-translation, and the author of the original work had checked the translation.

The PBQ measured tree types of pedestrian behaviours: errors (e.g. `I am both on the right side on the left on escalators`), violations (e.g. `I wait to the traffic light changes to green stopped on the street not on the sidewalk`) and lapses (e.g. `suddenly I realize that I travelled several streets and intersections without paying attention to traffic`).

The measure included 17 items rated on a 6-point scale. Each item described a specific behaviour that could be conducted by a pedestrian (error, violation or lapses). Consistent with the DBQ developed by Reason et al. (1990), respondents were required to indicate, on 6-point scales, how often they carried out each of the PBQ behaviours (1. never; 2. hardly ever; 3. occasionally; 4. quite often; 5. frequently and 6. nearly all the time). Respondents were also asked to report their age and sex, the number of years holding a full driving license, their weekly mileage, and period they walked as pedestrians.

First the scale was translated from Spanish into Portuguese. The translation of the scale was evaluated by using back translation. The scale was translated from Portuguese into Spanish by a bilingual and from Portuguese into Spanish by another bilingual. The translation of versions in Spanish (original and translated) was attested by the author of the instrument.

3. Results and Discussion

The results show differences according to age and sex (Table I). Young people commit more frequently violation than adults and men also reported more frequently violations than women. Regarding errors, the difference was found between age group. Young people often commit more errors than adults. All groups say they quite often commit behaviour typified as lapses.

Table 1: Pedestrians' Behaviour Questionnaire

Groups	Young (17-25)	Adults (25-49)	Men	Women	Driver	Non-driver
Violations	3,09	2,66	3,38	2,93	3,14	2,98
Errors	3,70	2,80	3,80	3,54	3,59	3,64
Lapses	3,51	3,23	3,54	3,46	3,38	3,56

Never(1); hardly ever (2); occasionally (3); quite often (4); frequently (5); nearly all the time (6)

Traffic accidents kill thousands of people each year and the situation is worse in developing countries mainly for pedestrians (Toroyan & Peden, 2007). The government needs to recognize traffic accidents as a public health problem in order to develop interventions aiming to reduce mortality caused by accidents (Söderlund & Zwi, 1995). Through studies on the factors contributing to risk of accidents it is possible to the government to find effective ways to prevent them (Velloso & Jacques, 2005). This study aims to add knowledge about the pedestrian's behaviour.

Regarding everyday behaviours characterized as violations, errors and lapses, the results show differences according to age and sex. Men and young people commit most often violations than women and adults. Regarding errors, the difference was found between the age. Young people commit more errors than adults. These results confirm that the study Moyano-Diaz (1997) held in Chile and also are similar those found by Bianchi and Summala (2002) on the driver's behaviours.

Gender and age is considered as risk factor among pedestrians (Moyano-Diaz, 1997; Ward et al., 1997; Toroyan & Peden, 2007; Mello Jorge & Koizumi, 2007). Regarding gender, men appear more likely to be involved in an accident (Ward et al., 1997; Toroyan & Peden, 2007) and commit more frequently violations (Moyano-Diaz, 1997).

The knowledge about violations, errors and lapses might be able to improve educators and authority's actions concerning traffic issues and could also be used as a framework to design targeted interventions. The pedestrian should know the rules relating to their situation in traffic and be aware that their actions affect their safety and other's (Rozestraten, 2004).

3.1 Limitations of the study

The present study has some methodological limitations that should be taken into account.

First, the samples of the study are not good represents of the entire population. Second, the data were based on self-reports of behaviour. It is possible that some respondents overstated their answers by reporting low levels of violations and errors. Third women and young people were overrepresented in this study making impossible to calculate significant differences between the groups. Fourth, deeply exploratory factor analyses need to be done to attest the struture of the PBQ and its variables.

A reapplication of the instrument in order to verify their factor structure and to compare it with the original is necessary because it is the first time that it's applied in Brazil and even in a small sample.

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