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Who Owns the Road? Exploring Driver and Pedestrian Behaviour at Zebra/Pedestrian Crossings in Gaborone, Botswana.

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Abstract

The paper explored driver and pedestrian behaviours at pedestrian crossings in Gaborone, Botswana. Specifically, the study observed distractive behaviours of drivers and pedestrians, pedestrian checking behaviour, and driver intimidation. A total of 500 drivers (391, 78.2% males and 109, 21.8% females) were observed as they interacted with pedestrians at pedestrian crossings at different locations and times. The results show that the majority of the drivers (80.4%) did not yield for pedestrians; thus most of the time, pedestrians were forced to stop for the drivers to pass. Chi square results indicate that the majority of the pedestrians (78.6%) were not distracted when crossing the road and that they were more likely to check both sides of the road before crossing. Pedestrian checking behaviour was also significantly influenced by driver intimidation behaviours. Furthermore, Chi square results show that pedestrians' tendency to cross at designated pedestrian crossings differed significantly when they engaged in distractive behaviours.

Key Words: Botswana, pedestrian crossings, road safety, driver behaviour, pedestrian behaviour.

Introduction

The Road Traffic Act of Botswana (1976), Chapter 69:01, Part VII, clearly articulates punishable offences committed by any person in violation of road safety. The Act is an attempt by the government of Botswana to increase road safety for all road users including pedestrians. To strengthen the effort, the government has gone further to form several statutory committees at national and district level (the National Road Safety Committee and the District Road Safety Committee, respectively) to further promote road safety; working together with the Department of National Transport and Communication which carries the overall responsibility for road safety matters in the country. Despite all these efforts, there seems to be an increase in road accidents in the country. Besides an increase in the number of vehicles, other contributing factors compromising road safety include some irresponsible and risk taking behaviours by some drivers and pedestrians

Traffic accidents have long been recognized as some of the major causes of death in Botswana. For example, Madzikigwa (2001) reported road fatalities in Botswana as some of the highest in the world, with about 32% affecting children and young adults (ages 5- 35). A study on road accident fatalities in Botswana by Mphela (2011) showed road accidents as the second cause of death after HIV and AIDS while Madzikigwa (2001) observed that road accidents generally exceed the number of deaths caused by other infectious diseases. Mupimpila (2008) reported 7,160 pedestrian casualties between 2000 and 2004. According to Pego (2009) pedestrian casualties for 2000 and 2005, children under the age of 15 accounted for 30% causalities while pedestrians (ages 15- 34) represented 50% and 47% for each of the years respectively. Furthermore statistics show more male (52%) than female (48%) casualties and significantly high gender differences in fatalities (males 60% and females 40%). Motshegwe (2008a) cited in Pego (2009) reported increased risk in pedestrian injuries and fatalities "when crossing high density roads which have inadequate pedestrian crossing facilities" (p.40). Most of the accidents occur during rush hours (06:00- 07:59 and 12:00- 13:59) when road users are rushing to work or involved in "work- related activities" (p.40) and on Fridays (31% and Saturdays (33%). Although many road users have a share in causing road accidents, drivers are the highest (85%) resulting in 54 (69.2%) deaths of other road users. Pedestrians' failure to check both sides of the roads accounted for 3% of all road accidents which translated into 20 (25.6%) deaths. Pego (2009) identified many causes of road accidents as failure to yield to other road users, speeding, and traffic violations which accounted for 96% and 97% of all accidents in 2000 and 2005 respectively.

According to the Botswana traffic police statistics (2001-2011), road accidents affect people of different ages mostly from 1 to 85 years with a slight drop for those over 85. In 2001, the report showed 7, 918 of road accidents of which 524 were fatal and 1,846 were serious. In all instances, there were more males than females. The most affected age group were children, young and middle adults (1- 45) with a steady decrease of ages 46-85+. Ten years later in 2011, the number of fatalities dropped to 6, 451 cases with 483 fatalities and 742 serious injuries. Again, the trend shows more males than females and more young and middle age adults. Besides the loss of life, the trend suggests economic loss as the majority of the people killed or maimed for life are the young and vibrant who have many years of life ahead of them to contribute to the economy of the country in many different ways.

Concerns about motor vehicle accidents is not only apparent in Botswana, it is worldwide phenomena. According to the World Health Organization (WHO, 2004) about 1.2 million deaths and 50 million injuries were attributed to road accidents every year. Studies on road accidents analysis from different countries paint a poignant picture of fatalities and serious injuries of diverse populations and ages (Varhelyi, 1998; Ackaah and Adonteng, 2011; Mphela, 2011). While road accidents statistics do not spare anybody, the pedestrian-vehicle collision is a serious concern because of the severity of the injuries and the heighted

possibility of death due to serious injuries sustained by pedestrians. Often times, occupants of the vehicle are not as badly affected as the pedestrians. In a study on accident analysis and prevention in Riyadh, Saudi Arabia, Al-Ghamdi (2002) reported 77.1% of the pedestrians were struck by a vehicle while crossing the road at non-designated areas. The majority of these injuries were reported to be fatal. Another study by Martinez and Porter (2004) reported that approximately 10% of crash fatalities in the state of Virginia were pedestrians. In Ghana, Ackaah and Adonteng (2011) reported that pedestrians accounted for 42% of all road traffic fatalities. The authors stated further that although pedestrian-vehicle accidents were common, they were also exacerbated by several factors such as time of day, and both driver and pedestrian behaviours, among others. Similar results were reported by Endirisinghe, Sajeer, Kamil, and Ziyarooun (2011) in their study of driver behaviour at pedestrian crossings. They reported that driver behaviours such as not stopping for pedestrians to cross and overtaking at pedestrian crossings, as well as not giving way to pedestrians contributed to pedestrian-vehicle collisions. Their findings showed that drivers not stopping for pedestrians to cross at pedestrian crossing accounted for 9.1% pedestrian-vehicle collisions while 3.4% of the collisions were attributed to drivers overtaking at pedestrian crossings.

Earlier research by Varhelyi (1998), had also reported drivers' unwillingness to give the right of way to pedestrian as one of the major contributing factors to pedestrian-vehicle collision accidents. A study by Simončič (2001) on road accidents in Slovenia indicated that most of the people owned a vehicle as a sign of status. However, the down side was the relatively high (30%) accidents involving pedestrians. According to another study by Schmidt and Farber (2009), most of the accidents happen at pedestrian crossings where both pedestrians and drivers feel particularly entitled to the right of way. Questions like who should yield for whom appear to always cause a problem between these two road users, yet pedestrians are by far more vulnerable than drivers. The study reported 36,000 accidents involving pedestrians.

Whether pedestrian crossings actually prevent pedestrian- vehicle collisions remains unclear. Researchers have continued to debate the safety of marked pedestrian- crossings. An earlier study by Varhelyi (1998) on driver speed behaviour at zebra crossing in Helsinki showed that 84% of pedestrian-vehicle collisions at marked pedestrian crossings were attributed to pedestrians' failure to check both sides of the road before crossing; even at pedestrian crossing areas. Similar findings were reported by Koepsell, McCloskey, Wolf, Moudon, Buchner, Kraus, and Patterson (2002) who found that marked pedestrian crossings escalated road accident injuries and fatalities. An earlier study by Evans and Norman (1998) reported that pedestrians-vehicle collisions increased when pedestrians decide to cross the road at non-designated pedestrian crossing areas. Similar findings were reported by Hatfield, Fernandez, Job, and Smith (2007) who emphasized that when drivers or pedestrians violate traffic rules such as failure to yield to pedestrians or pedestrians crossing at non-designated pedestrian areas, pedestrian-vehicle collisions become more feasible. Kaparias, Bell, Miri, Chan and Mount (2012) found that pedestrians felt safer and more comfortable when crossing the road at safe pedestrian zones where there were fewer cars.

Some studies have looked at the role of speed in pedestrian- vehicle collisions. For example, Varhelyi (1998) and Schmidt and Farber (2009) found that pedestrian crossing behaviour was also influenced by both speed and distance of the vehicle. They found that pedestrians tended to cross the road anywhere when they perceived the vehicle to be far and travelling at a low speed, thus putting themselves at risk. Cell or mobile phone use by both drivers and pedestrians was found to be a factor in pedestrian-vehicle collisions. Nasar, Hecht, and Werner (2008) found that pedestrians talking on cell or mobile phones contributed to pedestrian-vehicle collisions while Mphela (2011) reported cell or mobile phone use on the drivers' side as a contributing factor to road accidents.

It is evident from literature that issues of road safety continue to be of great importance globally and different countries are persistent in their search for better ways of improving road safety for the different road users. While Botswana is one of the countries with a very small population, it has had its big share of road accidents, particularly those involving pedestrians. With the vehicle population growing faster than the human population, it is even more pressing for the country to look into more sophisticated ways of improving road safety for all road users, particularly for pedestrians of all ages.

Purpose of the study

Although pedestrian and driver behaviours at pedestrian crossings have long been recognised as contributing factors to road accidents, not much research has been done on the topic. Therefore, the purpose of the present study was to examine driver and pedestrian behaviour on the road in Botswana, particularly at designated pedestrian crossings. The study sought to particularly see how the drivers and pedestrian shared the road. Specific research question addressed in this study were: 1) Do drivers stop for pedestrians or do pedestrian stop for the drivers? 2) Do pedestrians cross the road at pedestrian crossing areas? 3) Do pedestrians check both sides of the road before crossing? 4) Do drivers intimidate pedestrians as they try to cross the road? 5) Do pedestrians intimidate drivers? 6) Are there any distracting behaviours that either drivers or pedestrians are involved in? 7) Are there any gender differences in driver behaviour?

Methods

Design

This study utilized observational design to capture data at different locations in Gaborone which is the capital city of Botswana and data was collected at a time which is considered peak or rush hour. The research team made a total of five hundred (500) observations over a period of three days (7^{th}, 8^{th}, and 12^{th}) in March 2013.

Procedure

On the day of data collection, the research team went to three locations in Gaborone to observe and record driver and pedestrian behaviours at different times of the day. The locations visited were the University of Botswana, Gaborone station, and Botswana Building Society mall. Observations were made in the morning (07:30- 08:30) and behaviours were recorded as they happened on the roads at the identified locations.

Data analysis

Descriptive statistics were run on all the variables in this study. The descriptive statistics included frequencies and percentage tables. Cross tabulations and Chi- square analysis were used to examine relationships between driver and pedestrian behaviours.

Results

A total of five hundred drivers were observed at the above mentioned locations and of the five hundred drivers, 391(78.2 %) were male drivers and 109 (21.8%) were females. The numbers of drivers observed at the three locations were fairly distributed with 158 drivers observed at UB pedestrian crossings, 196 at the taxi station and 146 at the BBS mall pedestrian crossings. The study revealed that even though most of drivers (85.8%) were not distracted by anything, a majority of them (80.4%) did not yield for the pedestrians at the pedestrian crossings. Only 98 (19.6%) of the drivers gave way for the pedestrians and the majority of the time pedestrians were forced to stop for the drivers to pass. Some of the drivers engaged in some distracting behaviours even when driving through the zebra

crossings. Table 1 below indicates the frequency of driver distracting behaviours that were observed.

Table 1: Frequency of Drivers' Distractive Behaviours

Distractive Behaviour	N	%
None	429	85.8
Talking on Cell phone	23	4.6
Texting on Cell phone	6	1.2
Talking with Passengers	41	8.2
Eating	1	0.2

Of the 71(14.2%) drivers who engaged in distractive behaviours at the pedestrian crossings, 19 were females and 53 were males. With regards to driver intimidation behaviours the following behaviours were noted; some drivers did not stop at all and some honked at the pedestrians when they tried to cross. Half of the drivers drove through the pedestrian crossings despite the presence of pedestrians who were waiting to cross while 18 (3.6%) of the drivers honked at the pedestrians who tried to cross. Both male and female drivers did not yield for pedestrians whereas the honking was done only by male drivers.

The study revealed that most pedestrians do not check both sides of the road before crossing. Of the five hundred observations, only 77(15.4%) observations highlighted that pedestrians checked both sides of the road and slightly more than half (54%) of the observations indicated that pedestrians crossed at the designated crossings. The majority of the pedestrians (78.6%) were not distracted when crossing the road. However, some of the pedestrians were talking on their cell phone while crossing the road (9%), three were texting while crossing the road, fifty five (10%) were engaged in conversation with other pedestrians and four (0.8%) were eating while crossing the road. Furthermore the findings also showed pedestrians' tendency to check both sides of the road before they cross the road differed significant depending on whether they were distracted or not. Pedestrians who were not distracted were more likely to check both sides of the road before they crossed the road, X^2= 39.012, (p=*.000*). The results are illustrated in Table 2 below.

Table 2: Pedestrian Distractions and Checking Behaviour

Distractions	Checking behaviour		Total	Chi Square
	Yes	No		
None	350	43	393	39.012*
Cell talking	28	17	45	
Cell texting	3	0	3	p= .000
Conversation	41	14	55	
Eating	1	3	4	
Total	423	77	500	
	423	77	500	

In addition, findings show that pedestrians' tendency to check both sides of the road before crossing differed significantly depending on whether the drivers were intimidating or not (X^2= 16.430, *p=.001*) as illustrated in Table 3 below.

Table 3: Driver Intimidation and Pedestrian Checking Behaviour

Driver Intimidation	Pedestrian Checking behaviour		Total	Chi Square
	Yes	No		
None	209	23	232	16.430*
No stopping	203	47	250	
Honking	3	0	3	p= .001
Total	423	77	500	
	423	77	500	

Table 4: Cross tabulations and Pearson Chi Square Result: Pedestrian crossing at designated areas and Pedestrian Distractions.

Crossing at Designated Crossings	Pedestrian Distractions		Total	Chi Square
	Yes	No		
Yes	253	18	271	35.347*
No	170	59	229	
Total	423	77	500	p= .000

The results above (Table 4) show that pedestrians' tendency to cross at designated pedestrian crossings significantly differed when they engaged in distractive behaviours.

Discussions

Consistent with findings from Varhelyi (1998) and Endirisinghe et al., (2011) studies, the current study showed that the majority of drivers do not yield for pedestrians at the designated pedestrian crossings. This behaviour was evident among both female and male drivers. As highlighted above, road users' sense of entitlement often results in drivers intimidating pedestrians as observed in the current study (Schmidt & Farber, 2009). Important to note is that drivers' unwillingness to stop for pedestrians at designated crossings has been linked to fatal road accidents in different countries (Endirisinghe et al., 2011; Koepsell et al., 2002; Varhelyi, 1998). Similarly, prior studies in Botswana have also demonstrated that failure to yield to other road users similar to observations made in this study account to a fair amount of road accidents in the country (Pego, 2009). Furthermore, the study also revealed that driver behaviour also impact on how pedestrians behave as road users. Findings showed that pedestrians are more likely to check both sides of the road before crossing when drivers intimated them. This finding suggests that pedestrians are not

comfortable to cross at zebra crossings and to ensure that drivers do drive run them over at zebra crossings they check both sides . The noted finding is highlighted by the statistic that showed that in 80.4 % of the observations , it was pedestrians who stopped to give way to drivers.

On one end, pedestrians who were distracted were less likely to check both sides of the road before they crossed and more likely to cross at none designated crossing areas. Pedestrian behaviours noted above put pedestrians at risk of vehicle –pedestrian collusion (Hatfield, Fernandez, Job, & Smith (2007) particularly crossing at non designated areas (Evans & Norman, 1998) since distractions decrease pedestrians level of awareness (Nasar, Hecht & Werner, 2008). In Botswana, pedestrians' behaviours noted above have been shown to have contributed to 25.6% road traffic deaths (Motshegwe as cited by Pego, 2009). However, although such evidence exists, there is scant empirical evidence that shows how the problem can be effectively addressed to reduce the number of pedestrian fatalities.

The study also demonstrated that compared to drivers, observed pedestrians engaged more in distractive behaviours and the most common distractive behaviour among the pedestrians was talking on the cell phone while crossing the road. According to Mphela (2011), road users' use of cell phone decreases their level of alertness as such placing them at high risk of getting into road accidents. The observed pedestrian behaviours in the current study place pedestrians at risk of being hit by vehicles because of their lowered awareness level. The drivers on one hand engaged in conversations with passengers more as compared to pedestrians which have also been highlighted as one of the factors that contribute to road accidents.

Conclusions

Findings of the current study show that the observed drivers had a sense of road ownership as compared to the pedestrians. This finding suggests that drivers do not view pedestrians as legitimate road users and this was demonstrated by pedestrians' inclination to give drivers the right of way at pedestrian crossings because when they did otherwise the drivers intimidate them. Interestingly, it was observed that driver intimidation was prevalent among both male and female drivers. However, male drivers used more forceful intimidating means like honking at the pedestrians to deter them not cross. Drivers also engaged in behaviours that were distractive behaviours which many scholars have highlighted as risky road user behaviours. Similarly, pedestrians were also observed to engage in behaviours that place them at risk of being hit by vehicles such as crossing at non designated areas, engaging in distractive behaviours and not checking both sides of the road before crossing the road. Overall, findings of the current study show that both pedestrians and drivers engage in behaviours that contribute to road accidents

Limitations

Given that the current study was exploratory, the researchers did not collect data from major roads that are utilized by both pedestrians and drivers. As such more research that will capture data from such roads is needed in order to generalize the study's findings. Additionally, more data examining the drivers and pedestrians during busy/ peak times is needed as this will illuminate on different road users behaviours and consequently inform formulation of interventions.

Recommendations

To address the unsafe behaviours noted in the study, the government should strengthen road safety campaigns (Mphela, 2011). Efforts to strengthen road safety should not only involve government but should be multisectorial. The government should also improve public transport and encourage its use to ease the congestion of traffic that often results in

pedestrians and drivers at logger heads about who has the right to use the road. Efforts should also be made to improve road designs to accommodate different road users' needs to ensure safety for all. Furthermore, drivers who violate pedestrian crossing rules should be made to pay a stern fine and be required to undergo mandatory classes on safe road sharing. Similarly, pedestrians should also be fined when they violate road safety rules.

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Bioprofile

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