TRAFFIC RISK PERCEPTIONS IN A GHANAIAN PUBLIC

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Introduction

Road traffic accidents are one of the most frequent causes of injury-related deaths worldwide (Åstrøm, Moshiro, Hemed, Heuch & Kvåle, 2006). According to the World Report on Road Traffic Injury Prevention (Peden et al., 2004) traffic accidents account for about 3000 daily fatalities worldwide. Statistical projections show that during the period between 2000 and 2020, fatalities related to traffic accidents will decrease with about 30% in high-income countries. The opposite pattern is expected in developing countries, where traffic accidents are expected to increase at a fast rate in the years to come. Data recorded in Ghana from 1994 to 1998, indicate that road traffic accidents were the main cause of injury-related fatalities during this period (Afukaar, Antwi & Amaah, 2003). If these tendencies are allowed to continue, traffic accidents are predicted to be ranked number three related to disability-adjusted lost life-years and will be on sixth place as a major cause of death worldwide fatalities in 2020 (Peden et al., 2004). Hence, road traffic accidents represent a major threat to public health.

Although the argumentation above implies that traffic related research is needed in developing countries, empirical studies of perceived traffic risk in Sub-Saharan Africa remains scarce. Due to economic growth in developing countries in this region, road traffic is expected to increase in the future. This may in turn increase the already higher risk of traffic accidents in developing countries in Sub-Saharan Africa. Measures aimed to reduce traffic accidents in industrialized societies have tended to focus upon expensive road and vehicle improvements. However, because developing countries generally do not have the economic resources for expensive improvements of roads and vehicles, alternative human factor approaches to traffic safety should be considered in these societies. Hence, one of the core aims of the present report is to investigate traffic risk perception in a developing country in Sub-Saharan Africa. The survey was also carried out in a Norwegian public. Although the results from the Norwegian survey are not discussed in depth in the present report, the

results from the Norwegian survey are included for comparative purposes.

Deery (1999) defined traffic risk perception as a subjective interpretation of the risk involved in various traffic situations. This concept is thought to be important for traffic safety, because it may predict how drivers act out in traffic. For instance, Elvik (1989, cited in Kanellaidis, Zervas & Karagioules, 2000) argued that traffic safety depends on the drivers' ability to correctly perceive the risk involved in various traffic situations, and adjust their speed in accordance with this risk assessment. Deery (1999) proposed that higher subjective appraisal of traffic risk increases tendencies to conduct protective traffic behaviour. Protective driver behaviour may be manifested through seatbelt usage, speed reductions and driving that is overall in accordance with traffic regulations. Hence, some of the variation in behaviour across countries may be attributed to differences in how the drivers perceive traffic risk.

The health belief model (Rosenstock, 1974, cited in Stroebe & Stroebe, 1995) proposed that preventive behaviour is more probable when the individuals perceive themselves as vulnerable to a particular risk item. It is likely that an individual will behave more careful in traffic when it perceives higher probabilities of traffic accidents. Meanwhile, several studies indicate that the cognitive component of traffic risk perception (i.e. probability of traffic accidents) and driver behaviour is weakly related. For example, Rundmo and Iversen (2004) found that perceptions of traffic risk had weak relations to reported driver behaviour (see also Iversen & Rundmo, 2002; Rundmo, 1998). However, these results should be interpreted with caution due to two interrelated reasons. First, these studies investigated general perception of traffic risk, instead of risk perception related to specific traffic accidents and situations. Secondly, the internal reliability in the risk perception scales was relatively low.

Variation in perceived traffic risk is not solely related to the particular traffic situations in question. An extensive body of empirical studies indicates that traffic risk perception relate to demographic characteristics. Sivak et al. (1989) reported that male respondents perceived lower risk of slide-projected traffic scenes than female respondents. Dejoy (1992) argued that males perceive themselves as less susceptible to traffic accidents, and are more optimistic on the behalf of their own driving skills than females. When investigating the effects of a traffic safety campaign among Norwegian adolescents, Rundmo and Iversen (2004) found that females reported higher probabilities of traffic accidents after the campaign than

male respondents. This implies that the campaign had a stronger effect on perceived traffic risk among females compared to males. Broadly speaking, the majority of the published literature indicates that the tendency for males to estimate lower traffic risk than females is empirically robust.

Several studies also argued that age differences are important for variation in perceived traffic risk. Sivak et al. (1989) found that adolescents estimated the risk of various traffic events as lower than middle-aged peers. Tränkle et al. (1990) demonstrated that young males estimated lower risk of 100 slide projected traffic scenes than older males. These findings are in line with traffic accidents statistics showing that younger males are more likely to be involved in traffic accidents (Iversen, 2004). A possible explanation is that adolescents interpret the risk of traffic situations less efficient than older and more experienced drivers (Deery, 1999). Adolescents also have a tendency to overestimate their own driving skills.

Levels of education may be related to traffic risk perception. Education can be considered as an indicator of socio-economic status, and it is possible that perceived traffic risks varies between individuals with higher and lower socio-economic status. Hoseth and Rundmo (2005) found that people with higher education demanded less risk transport risk mitigation than individuals with lower education. The same study showed that a higher demand for transport risk mitigation was related to higher levels of perceived traffic risk. This could suggest that individuals with higher education perceive lower levels of traffic risk than people with less education. This assumption is also supported in empirical investigations of general hazard risk (see e.g. Davidson & Freudenberg, 1996). To the knowledge of the author, few studies have examined differences in perceived traffic risk among individuals with various levels of education in developing countries.

As mentioned above empirical investigations of traffic risk perception in developing countries remain scant. However, a recent study examined perceived traffic risk is a sample from Tanzania (Åstrøm et al., 2006) and showed that the respondents perceived higher risk of traffic accidents than the objective probabilities reflected in local morbidity statistics. Male respondents rated their probabilities of being involved in traffic accidents as similar to females, even though local morbidity statistics show considerable higher risk for males to be involved in such accidents. These results indicate that individuals from Tanzania overestimate the probabilities of traffic accidents, and males fail to perceive their

considerably higher traffic accident risk in this country. Furthermore, the perceived risk among male as well as female respondents was higher in an urban area (Dar es Salaam) than in a rural community (Hai District).
The scarcity of studies that have investigated perceived traffic risk in developing countries renders the generality of the results from traffic risk perception studies questionable. In order to conclude that the same perceptions of traffic risk persist among individuals in industrialized and developing countries studies are needed in both contexts. Knowledge of risk perception in developing countries may be useful in order to develop human factor countermeasures adjusted to local cultures in these countries.

Data and methods

Sample

During March 2006, a self-completion questionnaire was devised among a stratified sample in Ghana (n = 299). This sample was stratified for two urban areas, different neighborhoods in Accra and Cape-Coast. These regions covered lower class, middle class, and, partly, upper class areas. People in these areas (n = 179) were randomly selected and subjected to interviews using the questionnaire. These respondents were contacted personally at work places, malls, and other gatherings, and interviewed by Norwegian and Ghanaian students who were trained in interview techniques. In addition, undergraduate psychology students and graduate geography students (n = 120) at lecturer theatres at the University of Ghana (Legon) in Accra were recruited to the sample. Of the 350 questionnaires distributed, 299 were returned. This resulted in an overall response rate, adjusted for that new respondents could join the sample, of 85.4%. The Ghanaian sample included 143 (49.7%) males and 145 (50.3%) females. The age of the respondents varied between 18 and 86 years (M = 31.39, SD = 12.16). Twenty nine per cent of these respondents had primary school as their highest completed education, 16.9% had completed high school and 54% had higher education.

Measures

The measure of perceived traffic risk included 12 items. These items measured perceived probability of personal injury, due to various traffic-related events. The measure was adopted from a questionnaire developed by Rundmo and Fuglem (2000). The five point scales were in Likert format

and ranged from “Very high probability” to “No probability”. The relevant demographic measures for the present study were gender, age, levels of education and place of residence.

Statistical analysis

Descriptive statistics were applied in order to investigate the means and standard deviations of traffic risk perception in the samples. In addition, descriptive statistics were used to determine general characteristics of the samples. Principal component analysis (PCA) with varimax rotation and Kaizer criterion was applied to identify the dimensions of traffic risk perception. Cronbach’s alpha coefficient and the average corrected item-total correlations were calculated to investigate the internal consistency of the scales. One-way analysis of variance (ANOVA) was applied to compare the Ghanaian and Norwegian respondents on the dimensions of traffic risk perception. An independent samples t-test was carried out to investigate gender differences in traffic risk perception. One-way analyses of variance were conducted to investigate whether sub-samples with different age, levels of education and place of residence differed in perceived traffic risk.

Results

Dimensionality of traffic risk perception

In order to determine the dimensional structure of the traffic risk perception measure, the 12 traffic risk perception items were subjected to a principal component analysis (PCA). Table 1 shows that 10 items were separated into two different dimensions. Two items were excluded from the original list of 12 items because they failed to load consistently. The two dimensions explained about 60% of the variance in traffic risk perception (see Table 1). The first dimension was entitled Traffic accident risks (α = .806). This dimension included various items related to traffic accidents (e.g. head on collision, collision with another vehicle from behind, and collisions with pedestrians). The second dimension consisted of items associated with General traffic risks (α = .882). These items related to the perceived risk of various roles in traffic, such as being in traffic in a motor vehicle, as a bicyclist, and as a pedestrian. As reported in Table 1, both scales had a satisfactory α-value and were consequently considered adequate for further analysis.

Table 1. *Dimensions of Traffic Risk Perception*

Dimension 1. Traffic accident risks (Cronbach's alpha .806, mean corrected item-total correlation .57)	Dim 1	Dim 2
Head on collision	.83	.20
The vehicle overturns in the roadway	.76	.24
My car running off the road	.75	.31
Collision caused by changing driving lane	.73	.23
Collision with a pedestrian	.52	.14
Collision with another vehicle from behind	.50	.16
Dimension 2. General traffic risks (Cronbach's alpha .882, mean corrected item-total correlation .75)		
As a rider of a bicycle	.23	.85
As a pedestrian	.23	.84
As a passenger of a motor vehicle	.26	.83
As a driver of a motor vehicle	.30	.78
Total variance explained	48.20	13.41

Traffic risk perceptions in Ghana and Norway

Table 2 presents the means and standard deviations of perceived traffic risk in Ghana. The results show that the Ghanaian respondents estimated higher risk of various traffic accidents than Norwegian peers. These differences were most notable for events with fatal potentials, such as head on collisions, the car running off the road, collisions due to changing driving lane, and vehicle overturning. The Ghanaian respondents estimated higher risk of being in traffic as a pedestrian, bicyclist, and passenger of a motor vehicle than the Norwegian sample (Table 2).

Table 2. *Means and Standard Deviations for Traffic Risk Perception in Ghana and Norway*

Indicator	Mean		SD	
	Norway (n = 247)	Ghana (n = 299)	Norway	Ghana
1. My car running off the road	2.40	1.79	1.24	1.13
2. Head on collision	2.30	1.51	1.25	1.09
3. Collision with another vehicle from behind	2.28	2.11	.99	1.23
4. Collision due to changing driving lane	2.36	1.80	1.09	1.14
5. Collision with a pedestrian	3.40	2.79	1.27	1.47
6. The vehicle overturns in the roadway	3.14	1.59	1.57	1.15
7. Collision with an animal	2.49	2.77	.99	1.47
8. Parking accident	3.67	2.76	1.18	1.40
9. As a driver of a motor vehicle	2.68	2.20	1.07	1.35
10. As a rider of a bicycle	2.63	2.15	1.26	1.35
11. As a pedestrian	2.72	2.21	1.31	1.41
12. As a passenger of a motor vehicle	2.59	2.12	1.01	1.30

Ratings given on a 5-point scale from (1) very high probability to (5) No probability

Table 3 reports the means and standard deviations of perceived traffic risk in Accra and Cape Coast in Ghana. Individuals from Accra and Cape Coast perceived different levels of traffic risk: Accra experiences a more complex traffic pattern with a higher level of motorisation, traffic flows and system risk. Accordingly, the results show that individuals from Cape-Coast perceived lower probabilities of collisions with another vehicle from behind, as well as collisions with pedestrians and animals (see Table 3).

Table 3 *Means and Standard Deviations for Traffic Risk Perception in Accra and Cape Coast*

Indicator	Mean		SD	
	Accra	Cape Coast	Accra	Cape Coast
	(n = 170)	(n = 47)		
1. My car running off the road	1.86	1.77	1.15	1.22
2. Head on collision	1.59	1.55	1.19	1.08
3. Collision with another vehicle from behind	2.11	2.38	1.15	1.57
4. Collision due to changing driving lane	1.87	1.70	1.15	1.09
5. Collision with a pedestrian	2.74	3.23	1.38	1.66
6. The vehicle overturns in the roadway	1.57	1.70	1.10	1.28
7. Collision with an animal	2.80	3.06	1.44	1.61
8. Parking accident	3.00	2.35	1.40	1.27
9. As a driver of a motor vehicle	2.33	2.24	1.38	1.46
10. As a rider of a bicycle	2.25	2.33	1.39	1.49
11. As a pedestrian	2.26	2.50	1.43	1.53
12. As a passenger of a motor vehicle	2.26	2.28	1.34	1.46

Ratings given on a 5-point scale from (1) very high probability to (5) No probability

A one-way analysis of variance (ANOVA) was carried out to examine whether the estimates of traffic risk differed significantly in Norway and Ghana. Country (i.e. Norway and Ghana) was included as the independent variable and the two dimensions of perceived traffic risks were used as dependent variables. The results from this analysis are reported in Table 4. Ghanaian respondents perceived significantly higher risk of traffic accidents ($F = 90.95$ (1,505), $p < .001$) and general traffic risks ($F = 29.00$ (1,514), $p < .001$) than Norwegian respondents.

Table 4. *Cross-Country Differences in Traffic Risk Perception*

Dimensions	Mean		SD		F
	Norway (n = 247)	Ghana (n = 299)	Norway	Ghana	
1 Traffic accident risks	2.65	1.93	.96	.73	90.95 ***
2 General traffic risks	2.66	2.15	1.00	1.13	29.00 ***

Ratings given on a 5-point scale from (1) very high probability to (5) No probability

***p < .001

Differences in perceived traffic risk due to gender, age, and education

The next step was to investigate whether individuals with different gender, age, and levels of education differed on the dimensions of perceived traffic risk. For the purpose of examining whether females estimated traffic risks as significantly different than males, a one-tailed independent samples t-test was carried out. Gender was included as the independent variable and the dimensions of traffic risk were used as dependent variables. A tendency was revealed for females (M = 1.96, n = 145) to estimate lower risk of traffic accidents than males (M = 1.91, n = 143). This difference was significant (t (268) = 1.68, p < .05) for the dimension of general traffic risk.

The samples were separated into three age groups: Adolescents (18-24 years), adults (25-44 years), and older adults (44+ years). Because the mean age in the Ghanaian sample was relatively low (M= 31.39, SD = 12.16), the threshold for the group with older adults was set to 44 years. In order to examine whether adolescents and older individuals differed significantly in traffic risk perception, a one-way analysis of variance (ANOVA) was carried out. Age group was included as the independent variable, whereas the two dimensions of traffic risk perception were entered as the dependent variables. The main effect of age groups failed to reach significance. However, a general tendency was revealed for adolescents (M = 2.02, n = 92) to estimate traffic accident risks as lower than adults (M = 1.89, n = 154) and older adults (M = 1.92, n = 33). On the general traffic risk dimension, Ghanaian adolescents (M = 2.07) estimated the risk items as higher than adults (M = 2.19) and older adults (M = 2.12).

The final step was to examine whether individuals with different levels of education varied significantly in traffic risk perception. The Ghanaian sample was separated into two groups: Ghanaian university students (n = 119), and Ghanaian non-university students (n = 175). A one- way ANOVA was carried out to investigate whether

respondents with higher levels of education perceived different levels of traffic risk than participants with less education. Education was used as the independent variable and the dimensions of traffic risk perception were entered as dependent variables. Levels of education failed to reach significance on the dimensions of perceived traffic risk. There was however a tendency for higher educated individuals (M = 1.86) to estimate more risk of traffic accidents than individuals with less education (M = 1.98). This tendency approached significance ($F = 3.68$, $p < .10$) for the dimension related to general traffic risk.

Discussion

The core aim of the present study was to investigate some results regarding traffic risk perception among a Ghanaian public. The results showed that Ghanaians tended to perceive relatively high levels of traffic risk. Some differences in traffic risk perception were also found between individuals from Accra and Cape Coast. Individuals from Cape Coast tended to estimate lower risk from a variety of the risk perception indicators. An interpretation is that the traffic pattern is more complex and the traffic volume and flows in Accra are considerably higher than in Cape Coast. This may in turn result in higher traffic accident risk in the Ghanaian capital.

A plausible explanation for the overall high risk estimates in the Ghanaian sample is that the traffic environment in Ghana is considerably more hazardous than in, for example, Norway. This assumption is supported by traffic accident statistics, which show that traffic accidents have been the main cause of injury related fatalities in Ghana for a longer period (Afukaar et al., 2003). Traffic accidents are still a major health problem in Norway and other developed countries. These countries have however been relatively successful in addressing and reversing the frequencies of these accidents (Peden et al., 2004). One possible explanation for the more dangerous traffic environment in Ghana is the absence of clearly defined traffic regulations in this country. In Norway, regulations concerning speeding and general driver behaviour are relatively strict. For instance, posted road signs state the speed limits in various areas, and sanctions for violating these limits are relatively severe. In Ghana, such road signs are rare and several areas lack explicitly defined speed limits. Furthermore, the Ghanaian law enforcement of traffic regulations is relatively scant. These factors probably contribute to more risk taking traffic behaviour and higher accident risk in Ghana. Another important aspect is that the separation between pedestrians, bicyclist, and motor vehicles is poor in Ghana. This may explain why Ghanaians perceived higher risk of being a pedestrian or bicyclist in traffic compared to Norwegian respondents.

An alternative interpretation is that general differences in the respective risk environments had an effect on the results. Boholm (1998) suggests that perceived risk is not merely influenced by the specific risk items in question, but also related to the general safety and security posed upon the individuals in their daily lives. Accordingly, Åstrøm et al. (2006) found that individuals in Tanzania overestimated the probabilities of traffic accidents, compared to the statistical probabilities of such accidents in

Tanzania. The authors concluded that individuals in developing countries are more preoccupied with daily threats to well-being (e.g. HIV/Aids, malaria, and infections), and thus have a more general awareness of risk than individuals in other countries. Affeltranger and Thomasson (2005) concluded that people in developing countries tend to stress urgent needs, such as food, stability, and income, more than preventative action towards common accidents. These psychological processes can result in less behavioural measures regarding traffic accidents among individuals in developing countries. Affeltranger and Thomasson (2005) claim that such risk tradeoffs, limits the efficiency of accident reducing measures in developing countries. A practical implication is that a reduction of social marginality may increase the focus on traffic safety among the public in developing countries.
An additional aim of the present study was to investigate perceived traffic risk in sub-samples, with different gender, age, levels of education and place of residence. It was hypothesized that females would estimate higher traffic accident than males. Further, adolescents were expected to perceive lower traffic than older individuals. Finally, higher educated people were thought to perceive lower traffic risk than individuals with less education. Broadly speaking, the results showed that these sub-samples did not diverge significantly in perceived traffic risk. However, general tendencies in the data material should be discussed.

Inconsistent with previous findings (e.g. Dejoy, 1992; Sivak et al., 1989), females tended to perceive lower general traffic risk than males. A possible explanation is that the lower risk estimates among Ghanaian females reflect differences in the gender roles in Ghana and Norway. Females in Ghana possess a more traditional role as caretakers than Norwegian females, while males tend to be the main providers of Ghanaian households. A consequence may be that males are more likely than females to use a vehicle in relation to for example work and travelling. This may increase the probabilities for males to be involved in traffic accidents. However, the differences between the genders were relatively marginal for the dimension of traffic accidents in the Ghanaian sample. This adds support to Åstrøm et al. (2006), who found that males and females in Tanzania perceived relatively similar levels of traffic risks. Statistics from Ghana show that males were represented in 73.1% of the traffic fatalities between 1994 and 1998 (Afukaar et al., 2003). The marginal differences in perceived traffic accident risk between the genders indicate that Ghanaian males fail to perceive their higher risk of being involved in fatal traffic accidents.

Previous studies (e.g. Deery, 1999; Quimby, 1988) have found that adolescents perceive lower traffic risks than older peers. The present results revealed marginal differences between adolescents and older individuals. Globally, adolescents account for over 50% of all traffic fatalities (Peden et al., 2004). A possible explanation for the marginal differences in perceived traffic risk among adolescents and older individuals could be that adolescents in Ghana fail to perceive their higher risk of being involved in traffic accidents. Hence, the misperceptions of traffic risk among this age group may partly explain their higher frequency of accident involvement in developing countries.

A tendency in the data material indicated that higher educated Ghanaians estimated higher traffic risk than less educated individuals. The present study is to the author's knowledge one of the first to investigate how levels of education relate to perceived risk in traffic. Thus, it is possible that individuals with higher education estimate higher traffic risk than individuals with lower levels of education. Earlier studies indicate that higher educated individuals estimate risk more in line with expert calculations than people with lower levels of education. Individuals with less education may be more influenced by reports in the media than by objective information (Lai & Tao, 2003). Soumerai, Ross-Degnan, and Kahn (1992) claim that the media tends to focus upon risks, which have lower probabilities and higher consequences, and put less emphasis upon common risks such as motor vehicle accidents. A consequence may be that lower educated individuals perceive traffic accidents as low-probability risks to a larger extent than individuals with higher education. This assumption should be interpreted with caution however, because several investigations show that the media is not as biased towards low-probability risks as previously assumed. In addition, the importance of the media seems to be more profound when people assess the risk for others, as opposed to the risk for themselves (see Wåhlberg & Sjöberg, 2000, for a review).

Summarizing, the present results indicate that Ghanaians perceive relatively high levels of traffic risk. A proposed explanation is that the traffic environment in Ghana contributes to the higher levels of perceived traffic risk in this country. The Ghanaian traffic environment is characterized by a considerably higher frequency of accidents and less regulation than, for instance, in Norway. A practical implication is that more efficient countermeasures are needed in Ghana. Furthermore, the results indicated that individuals with different demographic characteristics perceived relatively similar levels of perceived traffic risk. This may suggest that younger males fail to perceive their higher probabilities of accident involvement in Ghana. The author suggests that road traffic campaigns should aim to alter perceived traffic risk among younger males, as an attempt of reducing risky driver behaviour among drivers in this age group. This may in turn contribute to less risk taking traffic behavior in developing countries.

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