

PERCEPTION OF ROAD HAZARDS IN A TANZANIAN SECONDARY SCHOOL

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Abstract.

The study was conducted in a Secondary School in a rural area in Tanzania between January and February 2016. 212 students, 115 male and 97 female with an average age to 15,27, were divided into four classes and received a two-hour lesson with a traffic psychologist. The efficacy of the lesson was measured with a pre-and post Static Hazard Perception Test (SHPT) that required to the participants to indicate, using a sign (participants here were asked to make a circle), the location of the image shown where there was a potential safety hazard.

The aim of the lesson was to open a 'window of thought' on simple concepts such as road risk and danger. It was hoped that reflecting on these concepts would help improve student awareness of the dangers that can be found on the road.

The results show that a higher average number of students recognized danger in the SHPT after the lesson than before. Repeated measures analysis of variance (ANOVA) yielded a principal effect of the training on hazard perception ($F(1,210) = 27.519$, $p < .001$, partial $\eta^2 = .141$, observed power = .999), indicating that the students after taking part in the training detected significantly more hazards than they did before taking part in the training.

Although there are some limits in the research, the type of lesson given by a traffic psychologist may have helped the students to think about their user experiences of the road, of what may be considered a danger and how to better recognize these dangers on the road. Such results have implications for more effective road safety education in Africa.

Keywords: Tanzania, Training, Road Safety, Road Hazard, road education,

1. Introduction

If we think about the issues most prevalent in Africa, the things that immediately come to mind are hunger, malaria, AIDS, tribal clashes. A recent report by the WHO (2015) demonstrates that one of the most significant problems facing Africa is mortality on the roads. About 26 people die every hour because of a road crash in Africa. This is almost two and a half times the European rate.

The data and statistics presented by WHO paint a frightening scenario. African streets are ruled by truck drivers who are often aggressive and violent, committing crimes against others and themselves. Vehicles are used by their owners to intimidate others on and off the roads, which has particularly detrimental effects on drivers of couriers and taxis. In addition, WHO also reports that road rules are largely disobeyed and the laws against driving while intoxicated are never applied. All this leads to significant mortality rates: 16% of deaths on the roads globally occur in Africa, despite the fact that the African continent holds only 2% of the world fleet.

In Tanzania the Police reported that in 2014, over 3760 people were killed on the roads, and a further 14,530 were injured in road related accidents (Tanzania Traffic Police, 2015) but WHO (2015) estimates that the real figure is more than four times as much, with an estimated fatality rate of 32.9 per 100,000 inhabitants, placing it among the worst five African countries.

Unfortunately, the African political sphere cares little or nothing for the regulation and implementation of African road rules. In fact, many African countries lack even the basic standards. There are also other problems which are less easily quantifiable, but equally as serious: the lack of knowledge of road signs, the illegal trade in licenses, the purchase of trucks and buses now degraded by the European continent, adulterated petrol, the poor conditions of African roads and streets and the fatalistic beliefs (Lamont 2012).

Most affected by the street violence are pedestrians, cyclists, motorcyclists and of course, young Africans who grow up seeing snarled traffic that seems without rules or regulation.

Driver education is the first step to improving the dire situation in Africa. The possibilities presented by educating African drivers are manifold, because of new interventions available to educators around the world.

This paper explores a road safety education project within a Tanzanian secondary school. The road safety education project aims to work on the risk perception of students in the secondary school, but also to open a passage to new and prospective studies which are more targeted.

2. Methods

2.1 Study area

This study was undertaken between 17 January and 2 February 2016. The study was conducted in Suma Secondary School Engikaret, in the District of Longido, Arusha Region Tanzania (Fig. 1). The District of Longido is a rural area of the Tanzania which is close to the border of Kenya, and is known as the Masailand.

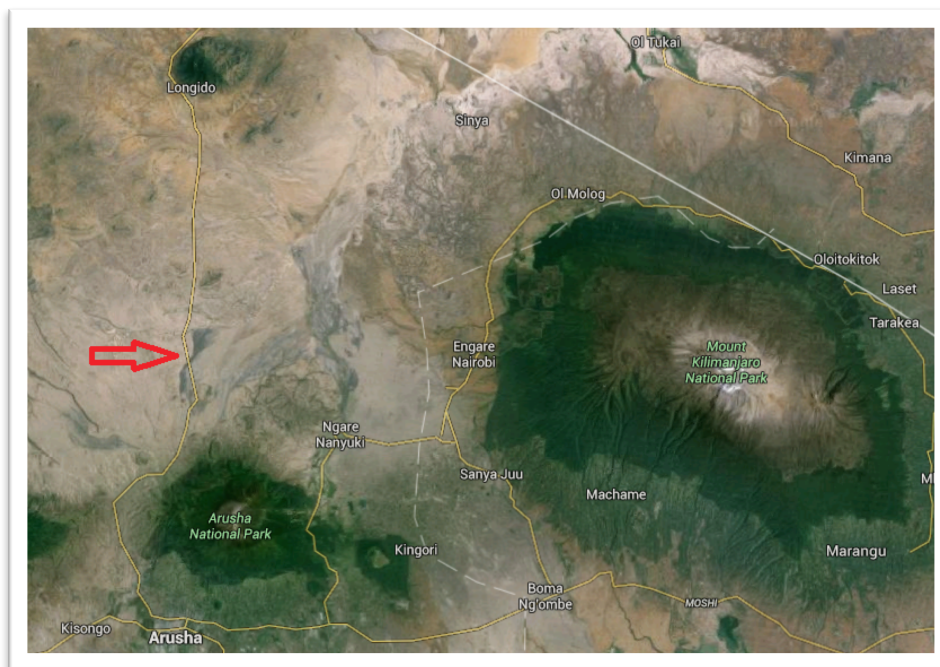


Fig. 1. The red arrow indicates the position of the SUMA Secondary School

2.2 Participants and procedure

This study was part of the larger Risk Perception project that was conducted in Suma Secondary School Engikaret. Suma Secondary School school has about 250 students, who are required to use English exclusively while at school. 212 students (mean age=15.27 SD=1.58, 115 male and 97 female), divided into 4 classes, took part in the study voluntarily and The Director of the School has provided permission for the project to go ahead. Informed verbal consent was sought from respondents before testing commenced.

The students had received a two hours class with a traffic psychologist. The efficacy of the lesson was measured with a pre, and then post Static Hazard Perception Test (SHPT).

2.3 Background of Traffic Psychologist

The first author qualified as a Traffic Psychologist in Italy and has been working in academic, commercial and volunteer settings in Italy, Tanzania and Australia. He undertakes voluntary work in Tanzania on an annual basis, including work in the Engikaret school, and was therefore familiar to staff and many students.

2.4 Lesson in the class

The aim of the lesson was to open a 'window of thought' on simple concepts such as street, risk and danger. It was hoped that reflecting on these concepts would help improve student awareness of the dangers that can be found on the road (Slovic, 2000). It is also known that the reflection on such topics has the potential to lead to the improvement of the response in a given task (Zepeda et al. 2013).

To achieve these aims, the lessons in the classroom were studied and divided into five different tasks to be completed with the students. The first four tasks were carried out using a methodology that would allow all students to be able to speak freely, and express their own idea about the task's key concepts. The questions were about what is the road, what is a hazard, what is a danger and in the last question was to give some example about hazards while using the road. All the student's answers were then written on the blackboard.

There were some difficulties in holding this type of lesson due to the small amount of participation from students, who seemed almost frightened to partake in the question and answers. The school teachers reported that they had never tried

to teach in this way. With students of the first class there also existed language problems. To counteract this a teacher stood alongside the traffic psychologist taking the lesson, and translated from English into Swahili.

For the fifth task the classes were divided into small groups of 8-10 students. Every group had 20 minutes to think of and present an advertisement about 'the right way to cross the road'.

The students were free to present the advertisement to the rest of the class using any of the tools that were available to them, including paper, pencil and video making technology (primarily through the use of mobile telephones).

Each group then presented their advertisement to the class. A 'jury', composed of by various school teachers, then chose the best advertisement, and presented the winning group with an award. All the advertisements were photographed, filmed and archived.

Unlike the first three tasks, there were no difficulties in executing the fifth task. All groups showed enthusiasm for the task and put a lot of effort into the creation and presentation of their advertisements.

2.5 Measures

The ability to anticipate traffic situations has been suggested to be an important aspect of driving competence and this ability, commonly termed hazard perception, has been measured in different ways. Some studies have measured the road hazard assessment carried out during the presentation of static images (Tränkle et al., 1990).

THE SHPT used in this project required participants to indicate, using a sign (participants here were asked to make a circle), the location of the image where there was a potential safety hazard.

This SHPT was chosen to evaluate the effectiveness of the lessons outlined above for a number of reasons (Malone and Brünken, 2013). In particular, this SHPT was chosen for its simplicity and ability to be conducted without the use of computers or electricity, which are not always available in the School. The images chosen represent four road situations drawn from movies made in the City of Arusha, and in the village of Sakina in Tanzania (Fig. 2, Fig. 3, Fig. 4, Fig. 5). The images have been selected because they represent all the following dangers together: pedestrians, motorcycles and vehicles.

It was the first time that students of this school carried out a work of this type and therefore, not finding alternatives in the scientific literature, we decided to give 30 seconds to the subjects in order to make the test.

The instructions for carrying out the test were given in English and Swahili and were as follows: "We are going to show you a picture about a road situation. Please put a circle (O) where you think there is a danger".



Fig. 2. Picture 1a



Fig. 3. Picture 2a



Fig. 4. Picture 1b



Fig. 5. Picture 2b

Each student was requested to do the SHPT two times: first in a pre-test before the lesson in the classroom, and second in a post-test after the lesson in the classroom.

Students participating in the Pre-test were given a different picture to use in the Post-test. For example, the student who used the 'Picture 1a' in the Pre-test, was asked to use the 'Picture 2a' in the Post-test.

During the Pre-test, the SHPT was preceded by a questionnaire with some socio-demographic variables such as gender, place of residence (urban or rural), and age. Question about the driving experience of the students with bicycles, motorcycles, cars trucks and buses was also asked (Fig. 6). The filling in of the questionnaire required in some cases the investigator's help; in particular, with the first class, where knowledge of the subject area was very low.

Fig. 6. Questionnaire

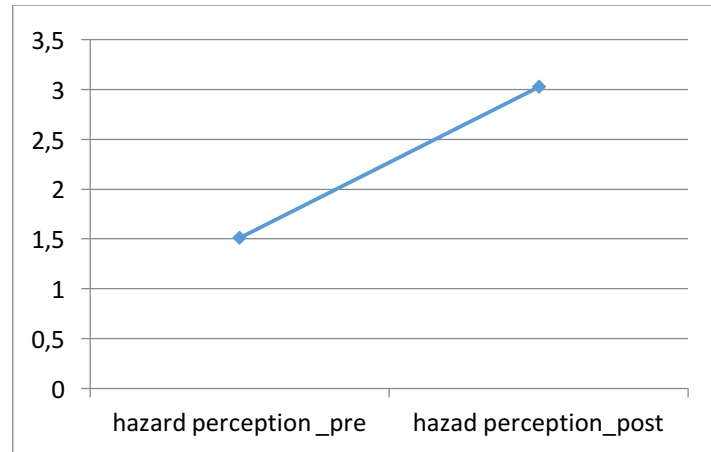
3 Results

The socio-demographic data and the road experience road data are summarized in Table 1; the data were collected with the questionnaires and the average of the recognized hazard with the SHPT.

Table 1. Results

	Students			Age	From		Bicycle		Piki-Piki		Car		Lorry		Hazard	
	M	F	Tot		Urban	Rural	Y	N	Y	N	Y	N	Y	N	Pre	Post
Form 1	30	26	56	13,98	31	25	40	16	3	53	3	53	0	56	1,34	3,04
Form 2	37	37	74	14,82	42	32	59	15	23	51	8	66	1	73	1,65	3,00
Form 3	19	20	39	15,85	25	14	33	6	4	35	4	35	0	39	1,31	2,82
Form 4	29	14	43	17,21	24	19	39	4	26	17	14	29	4	39	1,65	3,23
Total	115	97	212	15,27	122	90	171	41	56	156	29	183	5	207	1,51	3,02

A first comparison of the results was made for the average results between Pre-test and Post-test Repeated measures analysis of variance (ANOVA) yielded a principal effect of the training on hazard perception ($F(1,210) = 27.519$, $p < .001$, partial $\eta^2 = .141$, observed power = .999), indicating that the students after taking part in the training detected significantly more hazards than they did before taking part in the training (Table 2). There was no interaction effect of training with any socio-demographic variable nor with the global driving experience level: the training proved to be effective independently of the considered features of the participants (gender: $F(1,210) = 1.432$, $p = .233$, partial $\eta^2 = .009$, observed power = .221; place of residence: $F(1,210) = 0.026$, $p = .872$, partial $\eta^2 = 0$, observed power = .053; form: $F(3,210) = 0.213$, $p = .887$, partial $\eta^2 = .004$, observed power = .089; global driving experience level: $F(4,210) = 0.846$, $p = .498$, partial $\eta^2 = .020$, observed power = .266).

Table 2. Hazard perception pre-and post-training.

Even there were not interaction effect gender differences (Table 3) have been studied because, for literature, males believe their behaviours are less risky than the female and they believe that it is less likely to have an accident on the road (DeJoy, D.M., 1992). The results show that the females actually have a higher ability to recognize risks than males in both the Pre-test and Post-test.

Table 3. Difference between male and female about average of the recognized hazard

	Form 1		Form 2		Form 3		Form 4		Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Male	0,97	2,27	1,65	2,86	1,37	3	1,62	3,21	1,42	2,82
Female	1,77	3,92	1,65	3,14	1,25	2,65	1,71	3,29	1,61	3,27

For the cultural theory of risk, the perceived risk is determined by the cultural context of belonging (Dake, K., Wildavsky, A., 1993) and therefore we tried to figure out whether the subjects had different capacity to recognize hazard depending on the place of origin.

In according with the theory above the results show that students from rural areas acknowledged major number of hazardous situations in the submitted images than those from urban areas (Table 4).

Table 4. Difference between urban and rural area about average of the recognized hazard

	Form 1		Form 2		Form 3		Form 4		Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Urban Area	1,13	2,55	1,60	2,98	1,4	2,84	1,71	3,17	1,46	2,88
Rural Area	1,6	3,64	1,72	3,03	1,14	2,79	1,57	3,32	1,57	3,22

The statistics of road accidents say that novice drivers have a high collision risk compared to more experienced drivers. The absence of driving experience explains the lack of recognition of danger and thus a higher likelihood of making road accidents (Sagberg F., Bjørnskau T., 2006).

This means that students with no experience of driving should recognize less danger than those that have tried to drive but the results (Table 5) don't show this kind of psychological phenomenon and it would be really interesting understand why.

Table 5. Difference between students with drive experience and not

	Form 1		Form 2		Form 3		Form 4		Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Never Tried to drive	1,75	3,94	1,5	2,69	0,8	2,2	-	-	1,51	3,21
Tried to drive at least a bicycle	1,18	2,68	1,68	3,07	1,38	2,91	1,67	3,24	1,51	2,99
Tried to drive motorcycle or car or lorry/bus	1,17	2,33	1,72	3,16	1,5	2	1,77	3,32	1,67	3,03

4 Discussion

The initial idea of the project was to introduce new issues into the road hazard perception in a school Tanzanian and investigate whether this type of lesson could increase the results obtained in a static hazard perception test and therefore in some way raise awareness the young student of that school.

The data collected during the administration of pre- and post-tests show that an improvement in the analysis of risk situations, and in particular, although there are some limits in the research, the type of lesson with a traffic psychologist

might have helped the subjects to start to think about their user experiences of the road and then of what may be considered a danger and being able to recognize with more 'easier' (Slovic, 2010).

The collected data on socio-demographic variables in the pre-test results indicate a foregone conclusion: that the differences of social possibilities that exist between the countries of the third world and in industrialized countries are great.

In fact, and it has been suggested that the social and demographic characteristics would influence the perception of risk although few studies have been conducted on this issue (Millstein and Halpern-Felsher, 2002).

An example: data on the use of bicycles: 41 students out of 212 (19.3% of the sample) arrived adolescents say they have ever conducted a bicycle.

A stunning element if we think that the questionnaire it has not been asked if the bicycle was used daily, which might happen for the Europeans for example, but if it had never been used.

Surely this can slow down the ability of storing dangerous situations which will then be used either in journey on the road as a pedestrian either when subjects will become drivers of motor vehicles.

Increasing recognition of risky situations in the post-test and anyway the data more comforting for future road safety projects that will definitely benefit from the experience gained with this first intervention.

4.1 Limits

The construction and administration of the SHPT have some limitations due to the type of test which, as already mentioned earlier, was also chosen for 'environmental' reasons indeed reaching a highland in Tanzania with high technologies is not so easy.

The study of the data collected showed that the figure 1b was ambiguous because the presence of the various dangers in the foreground, in particular the motorcycle with the load placed bad, not brought the subject to search for any other dangerous situations to 'inside of the image'.

The lack of a control group is another limit of this search because the control group could highlight if the increased recognition of danger that was to be given over to the lesson also to the test repeated.

It would be interesting to study the effect of long-term project after six months and after a year because in the research, the Post-test was performed three days after the classroom lessons and one week distance from the Pre-test.

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