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EFFECT OF A ROAD SAFETY EDUCATION INTERVENTION ON ROAD SAFETY KNOWLEDGE OF UNIVERSITY DRIVERS IN IBADAN, NIGERIA

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ABSTRACT

Background: **It is essential for drivers employed in the formal sector to have good knowledge of road safety in order to safeguard their lives and those of the staff they are employed to drive. The study was conducted to determine the effect of a road safety education intervention on road safety knowledge of drivers employed in the University of Ibadan, Nigeria.**

Methods: **A quasi-experimental study of 98 intervention and 78 control drivers selected using a cluster sampling technique was conducted. The intervention comprised a two-day training on road safety and first aid. The drivers' knowledge of road safety was measured at baseline, immediately and 4-months post-intervention. Aggregate scores of road safety knowledge were computed giving minimum and maximum obtainable scores of 0 and 16 respectively. Change in mean scores over the three measurement periods was assessed using Repeated Measures Analysis of Variance (ANOVA). Independent t-test was used to compare the scores between intervention and control drivers at each of the assessment periods. Twenty-nine drivers did not complete the study (attrition rate = 16.5%).**

Results: **At baseline, mean road safety knowledge scores for the intervention and control drivers were 12.7±2.2 and 12.9± 2.3 (p = 0.510) respectively. Immediately and four months post intervention, the scores of the intervention drivers were 13.8±1.9 and 12.8±1.6; while scores for the controls were 13.3±2.0 and 13.2±1.8. Repeated measures ANOVA revealed that the increase in knowledge over the three assessment periods was not statistically significant.**

Conclusions: **The intervention resulted in an initial increase in road safety knowledge of the intervention drivers. However, this was not sustained to the forth month post-intervention. This finding suggests periodic refresher trainings to sustain the knowledge acquired.**

Keywords: Road safety knowledge; University drivers, Fleet safety, Road safety education

BACKGROUND

Globally, many people drive several hours to and from work on a daily basis and this exposes them to the risk of road crashes and ensuing injuries[1]. Those who drive for work are referred to as work-related drivers and have been described as, "individuals who drive at least once per week for work-related purposes"[2]. These drivers include truck drivers, couriers, police and emergency service drivers and sales people[3]. Other categories of work-related drivers described by Dimmer and Parker (1999) include, "senior executives provided with salary sacrificed vehicles, those who drive work-related vehicles both for work and non-work purposes, and those employed to drive fleet cars, vans, or other specialist vehicles"[4]. Over the years, work-related driver safety has become recognized as a significant cause of morbidity and mortality resulting in significant human and economic losses[5]. In view of this, interventions to reduce the incidence of work-related road crashes have been instituted[2]. It is essential for all road users including work-related drivers to have good road safety knowledge as this has been shown to influence driving behaviours and practices[6,7]. Some interventions to reduce work-related road crashes thus focus on educating the drivers about road safety issues and regulations[2].

In Nigeria, anecdotal reports indicate that many formal sector establishments including government institutions and private companies employ a substantial population of drivers. Although there is ample research on injury incidence, road safety practices such as seatbelt and helmet use, road safety and first aid knowledge among commercial drivers and motorcyclists in Nigeria and other developing countries[8-14], there is a paucity of published research on the road safety issues of drivers employed by formal establishments. This is in spite of the fact that (i) the job description of these drivers places them on the road for several hours where they

are exposed to the risk of road crashes and (ii) their formal work-environment provides a unique opportunity for their employers to organize training in road safety measures for them as well as facilitate their compliance to road safety regulations.

A previous study on, "the effect of a road safety and first aid training intervention on the road safety knowledge and first aid knowledge and skills of commercial drivers' plying the Lagos-Ibadan expressway", demonstrated a significant increase in all outcomes following the training intervention[8,15]. Based on this, the current research was extended to involve work-related drivers in view of the paucity of published findings among them and the impact of work-related crashes on human development[5]. Our research hypothesis was to determine if a road safety education intervention would result in a change in the immediate post intervention road safety knowledge of the drivers. Additionally, we sought to determine if the increase in knowledge would be sustained over time. Our study findings will be beneficial for employers of large fleets who desire to develop and implement road safety interventions for their drivers. In addition, the findings will also be useful in developing road safety policies that will include other categories of drivers.

METHODS

Study design

Data for this paper was drawn from a larger quasi-experimental study, "Capacity building of drivers employed in the University of Ibadan on provision of first aid for accident victims" conducted between February and August 2009.

Study area

The University of Ibadan established in 1948 is the Premier University in Nigeria. The University employs individuals to drive its fleet of official vehicles which comprise vehicles attached to principal officers and department heads, vehicles attached to various service departments such as the University Health Services, its security unit as well as the engineering unit etc.

Study participants

A total of 176 drivers (98 in the intervention and 78 in the control groups) employed by the University of Ibadan who were available at the time of the survey and who provided informed consent participated in the study.

Sampling technique

The number of drivers per faculty/service unit ranged from 0 to 52. Using blocked randomization, 10 clusters each comprising 15 – 24 drivers were created and clusters allocated to study or comparative groups. The drivers were trained according to their clusters comprising 15 - 24 drivers to enhance participation and ensure that they benefited maximally from the training[17]. The trainings for all the control drivers were conducted first in order to minimize interaction of control and intervention drivers.

Study procedures

The study was carried out in 3 phases: pre-intervention, intervention and post-intervention phase (immediate and 4-months post intervention). The pre-intervention phase involved administration of a semi-structured interviewer-administered questionnaire to the drivers. The pre-intervention data provided a baseline assessment of the drivers' road safety knowledge and revealed that although their knowledge was generally high, it was still not 100 percent. The information obtained from the pre-intervention data highlighted the gaps in the drivers' knowledge of road safety e.g. a number of the drivers were not aware of the speed limits on the expressway for different categories of vehicles and many were not aware of their roles in ensuring road safety. These and other identified gaps were thus emphasized during the training. The intervention drivers underwent a 2-day training in first aid while a training in HIV/AIDS was conducted for those in the control group. The training comprised didactic lectures and practical demonstrations. Development of the range of topics covered during the road safety training was guided by the gaps in the drivers' knowledge of road safety identified during the baseline, information on road safety contained in literature on road safety and information in the Nigeria Highway Code[1,16]. During the training, emphasis was placed on clarifying the drivers' misconceptions with regard to road safety identified during the baseline assessment. The Principal Investigator and officials of the Federal Road Safety Commission (FRSC) and Nigeria Red Cross facilitated the training. Additional details regarding the methodology have been reported in a previous publication[17].

Study measures for intervention and control drivers

The drivers' knowledge of road safety, was assessed before, immediately and four months after the intervention with the aid of an interviewer-administered semi-structured questionnaire. The aim of the four month intervention was to assess retention of long-term knowledge of the drivers. This assessment was initially scheduled to take place three months post-intervention, however, it was conducted in the 4th month because of a nationwide strike embarked upon by all university staff.

Data analysis

Drivers' knowledge of road safety

A total of 16 questions covering various aspects of road safety were asked and "one" point was awarded for each correct answer and "zero" for wrong answers. The scores were then summed giving minimum and maximum obtainable scores of 0 and 16 respectively. The respondents' mean score and standard deviation were computed and compared across the three study phases. Quantitative data was analyzed using SPSS version 20. Mean scores for the outcome variables were compared using repeated measure analysis of

Table 1: Socio-demographic characteristics including respondents' driving history

Socio-demographic characteristics	Intervention n (%) N = 98	Control n (%) N = 78	Statistic χ^2	p-value
Age group (years)[a]				
31 - 40	4 (4.2)	6 (7.9)		
41 - 50	32 (33.3)	34 (44.7)		
≥ 51	60 (62.5)	36 (47.4)	4.192	0.123
Mean Age (±S.D) years	51.7 (5.8)	50.6 (5.8)	t = 1.224	0.223
Marital status[b]				
Married	96 (99.0)	78 (100)		
Widowed	1 (1.0)	-	-	
Religion				
Christianity	75 (76.5)	54 (69.2)		
Islam	23 (23.5)	24 (30.8)	1.182	0.306
Tribe				
Yoruba	83 (84.7)	69 (88.5)		
Other	15 (15.3)	9 (11.5)		
Highest level of education			-	
Primary	69 (70.4)	51 (65.4)		
Secondary	24 (24.5)	23 (39.5)		
Post secondary	-	4 (5.1)		
Others	5 (5.1)	-		
Driving history				
Number of years working in U.I[c]				
≤ 10 years	12 (12.4)	16 (20.8)		
11 – 20 years	44 (45.4)	31 (40.3)		
21 – 30 years	26 (26.8)	19 (24.7)		
31 years and above	15 (15.5)	11 (14.3)	2.260	0.520
Mean (S.D)	19.2 (9.2)	18.2 (9.1)	0.649	0.809
Proportion of respondents who have been involved in accidents				
Yes	11 (11.2)	5 (6.4)		
No	87 (88.8)	73 (93.6)	1.218	0.270
Proportion of respondents who have assisted RTA victims in the month preceding the survey				
Yes	62 (63.3)	43 (55.1)		
No	36 (36.7)	35 (44.9)	1.195	0.274
Proportion of respondents who have ever received training on first aid				
Yes	52 (53.1)	52 (66.7)		
No	46 (46.9)	26 (33.3)	3.326	0.068

**Others including including Edo, Efik, Ishan*

a = no response (2 in the intervention group, 2 in control group)

b = no response (1 in the intervention group)

c = no response (2 in the intervention and 1 in the control group)

Table 2: Respondents' knowledge of road safety by study group and phase of study

Knowledge of road safety measures	Proportion of drivers with correct knowledge of road safety measures in the intervention group			Proportion of drivers with correct knowledge of road safety measures in the control group		
	Baseline n = 98 Freq (%)	*Immediate n = 97 Freq (%)*	*4 months n = 85 Freq (%)*	*Baseline n = 78 Freq (%)*	*Immediate n = 76 Freq (%)*	*4 months n = 62 Freq (%)*
The following are road safety measures						
Using a seat belt when driving [a]	98 (100.0)	97 (100)	85 (100)	78 (100)	76 (100)	62 (100)
Driving > 100 km/ hour on the expressway	79 (80.6)	87 (89.7)	70 (82.4)	63 (80.8)	67 (88.2)	47 (75.8)
Overtaking a vehicle on the crest of a hill	95 (96.9)	97 (100)	85 (100)	76 (97.4)	76 (100)	62 (100)
Obeying traffic signs [a]	98 (100)	97 (100)	85 (100)	78 (100)	76 (100)	62 (100)
Drinking alcohol while driving if you need it	97 (99.0)	97 (100)	85 (100)	76 (97.4)	76 (100)	62 (100)
Reducing your speed when driving in bad weather [a]	91 (92.9)	94 (96.9)	84 (98.8)	75 (96.2)	72 (94.7)	59 (95.2)
Making phone calls on your mobile phone when driving	98 (100)	97 (100)	85 (100)	78 (100)	76 (100)	62 (100)
Regular servicing of vehicles [a]	96 (98.0)	96 (99.0)	85 (100)	77 (98.7)	76 (100)	62 (100)
Road Crashes be prevented [a]	90 (91.8)	91 (93.8)	80 (94.1)	74 (94.9)	74 (94.9)	59 (96.7)
The following can be involved in RTA prevention						
Drivers [a]	76 (77.6)	93 (96.9)	60 (70.6)	59 (75.6)	64 (84.2)	46 (75.4)
Pedestrians [a]	46 (46.9)	57 (58.8)	26 (30.6)	43 (55.1)	44 (57.9)	29 (47.5)
Passengers [a]	42 (42.9)	54 (55.7)	39 (45.9)	41 (52.6)	43 (56.6)	36 (59.0)
Road Traffic Officers [a]	62 (63.3)	77 (79.4)	65 (76.4)	52 (66.7)	50 (65.8)	51 (83.6)
Police officers [a]	59 (60.2)	70 (72.2)	53 (61.4)	38 (48.7)	38 (50.0)	42 (68.9)
Bus conductors [a]	31 (31.6)	43 (44.3)	10 (12.0)	27 (34.6)	28 (36.8)	14 (23.0)
The speed limit for drivers on the expressway is 80 – 100km/hour [a]	89 (90.8)	93 (96.9)	77 (92.8)	75 (96.2)	74 (98.7)	54 (87.1))

[a] Correct responses

variance (ANOVA) for within group comparisons and the independent *t*-test for between-group comparisons. A p value of < 0.05 was considered statistically significant.

Ethical approval for the study was obtained from the University of Ibadan/University College Hospital Ethical Review Committee. Informed consent was obtained from all the drivers and they were all assured that participation was voluntary and they would not suffer any consequences if they chose not to participate.

RESULTS

Respondents' Socio-Demographic Characteristics

A total of 176 respondents, 98 in the intervention group and 78 in the control group participated in the study. Twenty-nine respondents did not complete the study giving an overall attrition rate of 16.4% (13.3% and 20.5% among intervention and control drivers respectively). The socio-demographic characteristics of the drivers in the intervention and control groups were largely similar (Table 1). The mean age of respondents from the intervention group was 51.7± 5.8 years compared with 50.6 ± 5.8 years among those in the

control group (p = 0.223). More than two-thirds of respondents 69 (70.4%) in the intervention group and 51(65.4%) of those in the control group had only primary education (Table 1). A higher proportion of respondents in the control group reported that they had attended at least a training in first aid 52 (66.7%) compared with those in the intervention group 52 (53.1%), p > 0.05 (Table 1).

Knowledge of Road Safety

At baseline, the road safety knowledge of the intervention and control drivers was comparable (Table 2). The mean scores on knowledge of road safety were 12.7 ± 2.2 and 12.9 ± 2.3 in the intervention and control groups respectively at baseline; independent t-test = 0.660; p = 0.510, (Table 3). In the immediate post-intervention phase, the scores were marginally higher among the intervention (13.8± 1.9) than control (13.3± 2.0) drivers; independent t-test = 1.733; p = 0.085.

In both groups of drivers, the mean road safety knowledge scores increased immediately after the intervention but this was higher among the intervention than control drivers. We tested the difference in mean pre (12.7±2.2) and immediate post-intervention (13.8±1.9) scores of the intervention drivers using a paired t-test and this showed a statistically significant difference in scores among the intervention group (paired t = 4.406; p < 0.001). There was no statistically significant difference in the mean pre (12.9±2.3) and immediate post-intervention (13.3±2.0) scores of the control drivers (paired t =1.168, p = 0.247).

Four months post intervention, intervention group scores fell slightly while scores among the control drivers increased. Repeated measure analysis of variance (ANOVA) showed no statistically significant change in road safety knowledge over the 3 study phases among the drivers in both the intervention and control groups (p> 0.05).

Table 3: Drivers aggregate road safety knowledge scores by study phase

Study phase	Knowledge score Intervention Mean (SD)	Control Mean (SD)	Independent T-test	p-value
Pre-intervention	n = 98 12.7 (2.2)	n = 78 12.9 (2.3)	0.660	0.510
Immediate post intervention	n = 97 13.8 (1.9)	n = 76 13.3 (2.0)	1.733	0.085
4-month post intervention	n = 85 12.8 (1.6)	n = 62 13.2 (1.8)	1.504	0.135

DISCUSSION

This intervention study assessed the effect of driver training on the road safety knowledge of drivers employed in the University of Ibadan. At baseline, respondents in both the intervention and control groups had high level of knowledge of road safety. This is comparable to findings of Mock, Amegashie and Kwame (1999) in their study among commercial drivers in Ghana that reported that many of the drivers had good knowledge of road safety[18]. The high level of knowledge of our study participants at baseline might be as a result of previous exposure to first aid training which might have covered some topics in road safety since up to half of them mentioned that they had received first aid training since commencing work in the University. Following the intervention, there was a significant increase in the road safety knowledge scores of the intervention drivers although this knowledge had reduced by the 4th month post-intervention. Johnson and Adebayo (2011) in their paper on, "The effect of safety education on knowledge of and compliance with road safety signs among commercial motorcyclists in Southern Nigeria" reported an increase in the post-intervention knowledge of their subjects although unlike our study, a high proportion of their respondents had a high knowledge 3-months post intervention[10]. This difference might be due to the fact that majority of our respondents already had good road safety knowledge prior to the intervention. In addition, the tendency for the level of acquired knowledge to reduce over time which has also been noted in other studies[19] may have contributed to the decline in knowledge among our sample. The average knowledge score of the control drivers increased slightly four months post intervention. This could have occurred because the intervention drivers

could have shared some information with the controls. Although efforts were made to minimize contamination after the trainings (control trainings were conducted before the intervention); this cannot be totally eliminated. In addition, drivers could have been exposed to road safety information from other sources during the period between the intervention and the second post-intervention assessment. However, exposure to other sources of road safety information would have been distributed randomly between both intervention and control drivers and would not have been limited to only the control drivers.

CONCLUSION

This study revealed that the training intervention resulted in an immediate increase in road safety knowledge, although this was not sustained to the fourth month post-intervention. Deliberate efforts to sustain immediate increases in knowledge through periodic re-trainings therefore need to be planned for at the point of development of such training programmes. In view of the study findings as well as the importance of good knowledge of road safety on driving behaviour and ultimately the occurrence of road crashes, we therefore recommend that the employers of the University drivers should provide them with periodic road safety training in order to instill and sustain good road safety knowledge in them.

LIMITATIONS

Our participants were drivers employed in the University hence, they may differ in socio-demographic characteristics as well as knowledge of road safety from drivers in other settings since they work in an academic community. Members of the academic and non-academic staff associations in all Universities nation-wide went on strike just before the second post-intervention assessment and this resulted in attrition as some of the drivers traveled out of state and though they were willing to participate in the 4th month assessments, they were unable to immediately return to participate in this assessment.

Competing Interests

The authors declare that they have no known competing interests.

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Authors' contributions

AO conceptualised and implemented the study, analysed the findings and wrote up the manuscript. ETO was AO's project mentor and was involved in the design and implementation of the project and writing of this manuscript. All authors read and approved the final manuscript.

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