An Assessment of the Knowledge, Attitude, and Practice of Phone Use While Driving and Crash Outcomes Among Drivers in Oyo State, Nigeria

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Abstract

This study aims to assess the relationship between crash outcomes and the knowledge of mobile phone hazards, attitude towards mobile phone use, and practices of mobile phone use among urban Nigerian drivers.

The study used a quantitative cross-sectional analytical design. A total of 377 completed responses were obtained through a self-administered questionnaire. The outcome measures were self-reported crash involvement, self-reported crash injury, and self-reported mobile phone-related crash involvement. The main predictor variables were the knowledge of mobile phone hazards while driving, attitude towards mobile phone use while driving, and practices of phone use while driving. Age, sex, marital status, level of education, and driving experience were used as potential confounders. Univariate and multivariate logistic regression analyses were used to compute the unadjusted and adjusted odds of each crash outcome.

The results show almost 75% of the study population reported that they had been involved in a crash event and sustained crash injuries in the past. Drivers with poor knowledge of mobile phone hazards while driving had significantly elevated odds of self-reported crash outcomes compared to those with good knowledge of mobile phone hazards while driving. Similarly, poor attitude towards phone use while driving and bad practice of phone use while driving were associated with significantly elevated odds of self-reported crash outcomes.

The conclusion calls for a need for greater awareness and intervention aimed at improving knowledge, influencing attitude, and changing the practices around mobile phone use among Nigerian drivers.

Keywords: Distracted Driving; Crash Injury; Mobile phone use while driving; Knowledge, Attitude, and Practice, Nigeria

The Burden of Road Crashes

Road injuries have evolved, not only as a crucial public health issue but also as a global concern. The alarming and increasing incidence of road injuries in developing countries has risen to an epidemic level (Lagarde, 2007; Nantulya & Reich, 2002). The Centre for Disease Control and Prevention (2016) has estimated that all over the world, 1.3 million lives are lost yearly to

road-related injuries, with half of these casualties being pedestrians, motorcyclists, and cyclists. Road crash fatalities are the 7th leading cause of death in low-income countries and the 10th leading cause of death in middle-income countries (World Health Organization, 2020). Internationally, road crash fatalities are the highest cause of mortality in young people aged between 5–29 years (World Health Organization, 2021).

In Africa, the cases of road crash injuries have been on the rise in the last 25 years, with the pooled injury rates increasing from 40.7 per 100,000 population in 1990 to 92.9 per 100,000 population in 2015 (Adeloye et al., 2016). According to a WHO report on road safety, Africa, in 2016, had the highest rate of fatalities from road traffic injuries globally at 26.6 per 100,000 population (World Health Organization, 2018). Also, more than 85% of all mortalities and 90% of disability-adjusted life years (DALYs) lost from road injuries happened in low- and middle-income countries (GBD 2013 Mortality and Causes of Death Collaborators, 2015).

Road crash fatality rates have been on the rise in Nigeria. Between 2013 and 2016, the WHO estimated that the crash fatality rate in Nigeria increased from 20.5 per 100,000 to 21.6 per 100,000 (World Health Organization, 2015, 2018). Currently, it is estimated that the crash fatality rate in Nigeria is 29.5 per 100,000 population (World Life Expectancy, 2018). About the same period, the proportion of mobile phone users in Nigeria increased from 21% in 2016 to 48% in 2021 (Statistica, 2021).[i] In Nigeria, road crash injury is the commonest reason for emergency room visits, and road crashes are responsible for the majority of emergency room mortalities (Afuwape et al., 2007).

Mobile Phone-Related Distracted Driving

Distracted driving is any activity a driver engages in that takes his/ her eyes and attention from driving (Bergmark et al., 2016). It is a driving behavior that increases the risk of property damage, injury, and death to persons related to the driving event (McDonald & Sommers, 2015; National Highway Traffic Safety Administration, 2017; TeenSafe, 2018). Yearly, over 3,000 fatal crash injuries are related to distracted driving in the U.S. (Centers for Disease Control and Prevention, 2021; National Highway Traffic Safety Administration, 2021). While distracted driving activities range widely, from eating while driving to looking at roadside objects (Klauer et al., 2014), mobile phone use is the most common and most addictive distracted driving activity (O. Adeyemi, 2021; Caird et al., 2014; Gliklich et al., 2016; Lipovac et al., 2017).

Mobile phone-related distracted driving results from the indiscriminate use of mobile phones while driving (National Highway Traffic Safety Administration, 2012). Poor driving performance has been associated with mobile phone use specifically when such devices are used for texting and calling (Benedetto et al., 2012; Ishida & Matsuura, 2001; Yannis et al., 2016). Furthermore, phone texting has been associated with reduced responsiveness, reduced vehicle control, near-collision, unintentional lane deviation, and crash-related injuries and deaths (Caird et al., 2014; Klauer et al., 2014). Additionally, dialing phones and answering calls while driving

is associated with about a four-fold increase in the odds of a crash injury (Fitch et al., 2013; Klauer et al., 2014; Olson et al., 2009; Simmons et al., 2016).

Knowledge, Attitude, and Practice of Phone Use While Driving

The Knowledge, Attitude, and Practice (KAP) model is commonly used to quantify background information about a public health issue, assess areas of potential intervention, and quantify the effectiveness of an intervention (Gumicio et al., 2011). Conceptually, adequate knowledge of the hazards of mobile phone use while driving, and appropriate attitudes towards the non-use of mobile phones while driving should affect the practice of phone use while driving. The practice of non-use of mobile phones while driving will result in an absence of mobile phone-related distracted driving and obviate the attendant consequences of distracted driving behaviors – crash involvement and fatal and non-fatal crash injury. Earlier studies have used the KAP model to evaluate mobile phone distracted driving among U.S. drivers (Nevin et al., 2017), Columbian commercial drivers (Amaya & Pinto, 2016), and Nigerian motorcyclists (Arosanyin et al., 2013).

Within the context of distracted driving, knowledge of the hazards of mobile phone use while driving refers to the understanding, or the awareness of the risks of engaging in mobile phone use while driving (Kaliyaperumal, 2004). Attitude towards mobile phone use while driving refers to the mental disposition towards engagement in phone use during a temporal driving event (Altmann, 2008). The practice of mobile phone use while driving refers to the interaction of a driver and a mobile phone during a temporal driving event. Akande and colleagues (2006) estimated that about 62% of the non-commercial drivers in Ilorin, a city in South-West Nigeria, were aware of the risks associated with mobile phone use while driving. Also, earlier studies have estimated that between 4 to 42% of Nigerian drivers use their phones while driving for primary (e.g. texting, dialing, receiving calls) and secondary (e.g. social media, driving assistance, scrolling) phone tasks (Adeola et al., 2016; Akande & Ajao, 2006; Olumami et al., 2014; Onyemocho et al., 2013).

Research Aims and Hypothesis

This study aims to assess the association between crash outcome measures and knowledge of mobile phone hazards while driving, attitude towards mobile phone use while driving, and practices of mobile phone use while driving. It is hypothesized that poor knowledge of mobile phone hazards, poor attitude towards mobile phone use while driving, and bad practice of mobile phone use while driving will be associated with increased odds of self-reported crash involvement, crash injury, and mobile phone-related crash involvement. Understanding the distribution of quantified measures of knowledge of mobile phone hazards while driving, attitude towards mobile phone use, and practices of mobile phone use while driving among Nigerian drivers may indicate a need for educational intervention aimed at reducing distracted driving

behavior. Additionally, quantifying the relationship between crash outcomes and the knowledge of mobile phone hazards while driving, attitude towards mobile phone use while driving, and practices of mobile phone use while driving may help quantify the risk associated with mobile phone-related distracted driving and may inform policy on safe driving on Nigerian roads. No publicly available study prior to this work has assessed the association between crash outcome measures and the knowledge of mobile phone hazards while driving, attitude towards mobile phone use while driving, and practice of mobile phone use among Nigerian drivers.

Methods

Study Population and Design

This cross-sectional study was conducted in Oyo State, Nigeria in March 2018. Oyo State is one of the most populous states in Nigeria, with over 5.6 million residents (Oyo State Government, 2019). The state has 33 local government areas (Oyo State Government, 2019), and 5 of these local governments were randomly selected for the study. The selected local governments served as clusters, and participants were randomly selected from each cluster. The selection criteria were as follows: the participants must be aged 18 years and older, possess a valid driving license, use a mobile phone, and have driven a four-wheeled vehicle within a month of the interview. Ethical approval was obtained from the Research Ethics Review Committee of the Oyo State Ministry of Health.

A paper-based self-administered questionnaire was administered. The total number of respondents was 406 persons. A total of 29 responses were deemed inconsistent. Cases classified as inconsistent were cases where the respondents consented that they were above 18 years but selected an age range below 18. Also, inconsistent responses occurred where the respondent stated that they never had a crash event but later stated that the crash injury affected one or more parts of their bodies. The final sample size was 377, representing 92.9% of the total responses collected.

Crash Outcome Measures

Three outcome measures were selected for this study. These outcome measures were self-reported crash involvement, self-reported crash injury, and self-reported mobile phone-related crash involvement. A self-reported crash involvement was defined by the question: “have you ever been involved in an accident?” Responses were binary: either yes or no. A self-reported crash injury was defined by the responses to the statements: “My past accidents affected only 1 part of my body” and “My past accidents affected multiple parts of my body.” The responses were binary, either yes or no. Respondents who responded yes to either or both statements were classified as having sustained crash injuries. Self-reported mobile phone-related crash involvement was defined by the question “Were any of the accidents linked to the use of mobile phones?” Responses to this question were binary (yes or no).

Knowledge, Attitude, and Practices of Mobile Phone Use While Driving

The main predictor variables were the knowledge of mobile phone hazards while driving, attitude towards mobile phone use while driving, and practice of phone use while driving. These variables were defined using three survey instruments: knowledge of mobile phone hazards while driving (KMPHD), attitude towards mobile phone use while driving (AMPUD), and practice of mobile phone use while driving (PMPUD) (Adeyemi, O.J., 2021).[ii]

The KMPHD is a seven-item survey instrument that measures the driver's knowledge of distracting phone activities and knowledge about handheld and hands-free phone use while driving. The instrument has good reliability, with a Cronbach alpha value of 0.88. The instrument had been validated among drivers in Nigeria. The item content validity index (ranging from 0 to 1) was 0.91 and the scale validity index (ranging from 0 to 1) was 0.92. The minimum and maximum scores were 7 and 35, respectively. Higher scores suggest higher knowledge of mobile phone hazards while driving. For this study, knowledge of phone use while driving was measured as a binary variable. Scores of 18 and higher were classified as good knowledge while scores of 17 and lower were classified as poor knowledge.

The AMPUD is a five-item survey instrument that measures the attitude towards using mobile phones while driving. The instrument has good reliability, with a Cronbach alpha value of 0.95. The instrument had been validated among drivers in Nigeria. The item content validity index (ranging from 0 to 1) was 0.83 and the scale validity index (ranging from 0 to 1) was 0.83. The minimum and maximum scores were 5 and 25, respectively. Higher scores suggest a more negative attitude towards phone use while driving. For this study, attitude towards mobile phone use while driving was measured as a binary variable. Scores of 13 and higher were classified as good attitude (supporting avoiding phone use while driving) while scores of 12 and lower were classified as poor attitude (less avoidant of phone use while driving).

The PMPUD is a seven-item survey instrument that measures primary and secondary phone activities while driving. The primary phone activities captured in the instrument are initiating and receiving calls and reading texts while driving. The secondary phone activities captured in the instrument included playing music on phones while driving, playing games on phones while driving, browsing the internet while driving, and scrolling the phone while driving. The instrument has good reliability, with a Cronbach alpha value of 0.92. The instrument had been validated among drivers in Nigeria. The item content validity index (ranging from 0 to 1) was 0.99 and the scale validity index (ranging from 0 to 1) was 0.99. The minimum and maximum scores were 7 and 35, respectively. Higher practice scores suggest non-engagement in phone activities while driving. For this study, the practice of mobile phone use while driving was measured as a binary variable. Scores of 18 and higher were classified as good practice while scores of 17 and lower were classified as bad practice.

Potential Confounding Variables

Potential confounders were selected from related literature (Akande & Ajao, 2006; Donkor et al., 2018; Olumami et al., 2014). These confounders were age, sex, marital status, level of education, and driving experience.

Statistical Analysis

The frequency distribution of the demographic, driving, and crash characteristics was summarized in Table 1 and Figure 1 below. The association between the self-reported crash outcome measures and the knowledge, attitude, and practices of phone use were assessed using the chi-square. Univariate and multivariate logistic regression was used to compute the unadjusted and adjusted odds of each crash outcome, respectively. Data were analyzed using the Statistical Package for Social Sciences version 26 (IBM Corp., 2018).

Results

Sociodemographic and Driving Characteristics

Most of the respondents were aged 18 to 30 years (51.5%), males (72.9%), married (55.4%), had tertiary education (60.2%), and had 5 years or fewer driving experience (52.5%) (Table 1). Age ($p<0.001$), sex ($p=0.029$), marital status ($p<0.001$), educational level ($p=0.002$), and driving experience ($p<0.001$) were significantly associated with self-reported crash involvement. Similarly, age ($p<0.001$), sex ($p=0.021$), marital status ($p<0.001$), educational level ($p=0.003$), and driving experience ($p<0.001$) were significantly associated with self-reported crash injury. Additionally, age ($p<0.001$), sex ($p=0.021$), marital status ($p<0.001$), educational level ($p=0.038$), and driving experience ($p=0.006$) were significantly associated with self-reported mobile phone-related crash involvement.[iii]

Crash Characteristics

About 74%, representing 280 persons, reported that they had been involved in a crash event in the past (Figure 1). Also, 73.7% of the sample population, representing 278 persons, reported that the crash resulted in injury to at least one part of their body. A total of 234 persons (62.1%) reported that they had been involved in a mobile phone-related crash event. [iv]

Figure 1

Distribution of crash outcomes in the study population. Crash outcomes were measured in three categories: involvement in a crash event, sustenance of crash-related injury, involvement in a mobile phone-related crash event

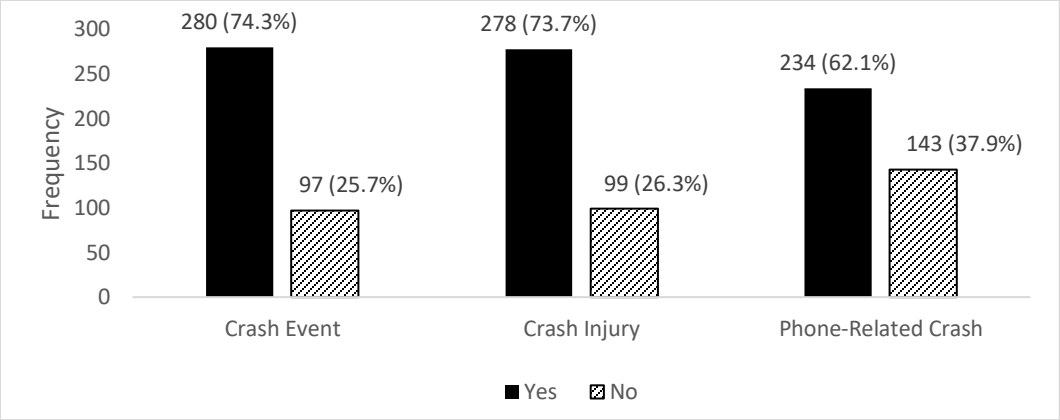
300
250
200
150
100
50
0
Frequency
280 (74.3%)
97 (25.7%)
278 (73.7%)
99 (26.3%)
234 (62.1%)
143 (37.9%)
Crash Event
Crash Injury
Phone-Related Crash
Yes
No

Table 1

Frequency distribution and association of crash outcomes and the demographic characteristics, driving experience, knowledge of hazards of mobile phone use while driving, attitude towards mobile phone use while driving, and practice of mobile phone use while driving

Variable	Frequency	Self-Reported Crash Involvement			Self-Reported Crash Injury			Phone-Related Crash Involvement		
	(N=377) (%)	Yes (n=280) (%)	No (n=97) (%)	p-value	Yes (n=278) (%)	No (n=99) (%)	p-value	Yes (n=234) (%)	No (n=143) (%)	p-value
Age categories										
18 – 30 years	194 (51.5)	123 (43.9)	71 (73.2)	<0.001	122 (43.9)	72 (72.7)	<0.001	105 (44.9)	89 (62.2)	0.004
31 – 40 years	105 (27.9)	86 (30.7)	19 (19.6)		86 (30.9)	19 (19.2)		69 (29.5)	36 (25.2)	
41 – 50 years	60 (15.9)	55 (19.6)	5 (5.2)		55 (19.8)	5 (5.1)		46 (19.7)	14 (9.8)	
>50years	18 (4.8)	16 (5.7)	2 (2.1)		15 (5.4)	3 (3.0)		14 (6.0)	4 (2.8)	
Sex										
Male	275 (72.9)	196 (70.0)	79 (81.4)	0.029	194 (69.8)	81 (81.8)	0.021	161 (68.8)	114 (79.7)	0.021
Female	102 (27.1)	84 (30.0)	18 (18.6)		84 (30.2)	18 (18.2)		73 (31.2)	29 (20.3)	
Marital Status										
Married	209 (55.4)	185 (66.1)	24 (24.7)	<0.001	184 (66.2)	25 (25.3)	<0.001	149 (63.7)	60 (42.0)	<0.001
Never Married	168 (44.6)	95 (33.9)	73 (75.3)		94 (33.8)	74 (74.7)		85 (36.3)	83 (58.0)	
Level of Education										
Primary/Secondary School	77 (20.4)	64 (22.9)	13 (13.4)	0.002	64 (23.0)	13 (13.1)	0.003	57 (24.3)	20 (14.0)	0.038
Tertiary Education	227 (60.2)	154 (55.0)	73 (75.3)		153 (55.0)	74 (74.7)		131 (56.0)	96 (67.1)	
Postgraduate	73 (19.4)	62 (22.1)	11 (11.3)		61 (21.9)	12 (12.1)		46 (19.7)	27 (18.9)	
Driving Experience										
5 years or less	198 (52.5)	128 (45.8)	70 (72.2)	<0.001	127 (45.7)	71 (71.7)	<0.001	108 (46.2)	90 (62.9)	0.006
6 – 10 years	95 (25.2)	76 (27.1)	19 (19.6)		76 (27.3)	19 (19.2)		66 (28.2)	29 (20.3)	
More than 10 years	84 (22.3)	76 (27.1)	8 (8.2)		75 (27.0)	9 (9.1)		60 (25.6)	24 (16.8)	
Knowledge*										
Poor Knowledge	99 (26.3)	44 (15.7)	55 (56.7)	<0.001	42 (15.1)	57 (57.6)	<0.001	17 (7.3)	82 (57.3)	0.006
Good Knowledge	278 (73.7)	236 (84.3)	42 (43.3)		236 (84.9)	42 (42.4)		217 (92.7)	61 (42.7)	
Attitude*										
Poor Attitude	135 (35.8)	64 (22.9)	71 (73.2)	<0.001	64 (23.0)	71 (71.7)	<0.001	24 (10.3)	111 (77.6)	0.006
Good Attitude	242 (64.2)	216 (77.1)	26 (26.8)		214 (77.0)	28 (28.3)		210 (89.7)	32 (22.4)	
Practice*										
Bad Practice	35 (9.3)	3 (1.1)	32 (33.0)	<0.001	3 (1.1)	32 (32.3)	<0.001	3 (1.3)	32 (22.4)	0.006
Good Practice	342 (90.7)	277 (98.9)	65 (67.0)		275 (98.9)	67 (67.7)		231 (98.7)	111 (77.6)	

*Knowledge refers to the knowledge of hazards of mobile phone use while driving; Attitude refers to the attitude towards mobile phone use while driving; Practice refers to the practice of mobile phone use while driving

Knowledge of Mobile Phone Hazards While Driving

About 26% of the sample population had poor knowledge of mobile phone hazards while driving (Table 1). Knowledge of mobile phone hazards while driving was associated with self-reported crash involvement ($p<0.001$), self-reported crash injury ($p<0.001$), and self-reported phone-related crash involvement ($p<0.001$).

When compared to respondents with good knowledge, respondents with poor knowledge of mobile phone hazards while driving were seven times more likely to report that they were involved in a crash (Odds Ratio (OR): 7.02; 95% CI: 4.20 – 11.75), eight times more likely to sustain a crash-related injury (OR: 7.63; 95% CI: 4.55 – 12.78), and 17 times more likely to report that they were involved in a phone-related crash (OR: 17.16; 95% CI: 9.47 – 31.10) (Table 2). After adjusting for sociodemographic and driving characteristics, respondents with poor knowledge of mobile phone hazards while driving were nine times more likely to report that they were involved in a crash (Adjusted OR (AOR): 8.65; 95% CI: 4.57 – 16.36), ten times more likely to report that they sustained a crash-related injury, (AOR: 9.58; 95% CI: 5.02 – 18.30), and 24 times more likely to report that they were involved in a phone-related crash (AOR: 24.34; 95% CI: 11.90 – 49.78) (Table 3).

Table 2

Univariate logistic regression assessing the relationship between crash outcomes and the demographic characteristics, driving experience, knowledge of hazards of mobile phone use while driving, attitude towards mobile phone use while driving, and practice of mobile phone use while driving

Variable	Self-Reported Crash Involvement	Self-Reported Crash Injury	Phone-Related Crash Involvement
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Age categories			
31 – 40 years	2.61 (1.47 – 4.65)	2.67 (1.50 – 4.75)	1.63 (0.99 – 2.66)
41 – 50 years	6.35 (2.43 – 16.60)	6.49 (2.48 – 16.97)	2.79 (1.44 – 5.40)
>50years	4.62 (1.03 – 20.67)	2.95 (0.83 – 10.54)	2.97 (0.94 – 9.34)
18 – 30 years	Ref	Ref	Ref
Sex			
Female	1.88 (1.06 – 3.33)	1.95 (1.10 – 3.45)	1.78 (1.09 – 2.92)
Male	Ref	Ref	Ref
Marital Status			
Married	5.92 (3.51 – 10.00)	5.79 (3.46 – 9.72)	2.43 (1.58 – 3.71)
Never Married	Ref	Ref	Ref
Level of Education			
Primary/Secondary School	0.87 (0.36 – 2.10)	0.97 (0.41 – 2.29)	1.67 (0.83 – 3.36)
Tertiary Education	0.37 (0.19 – 0.75)	0.41 (0.21 – 0.80)	0.80 (0.47 – 1.38)
Postgraduate	Ref	Ref	Ref
Driving Experience			
6 – 10 years	2.19 (1.22 – 3.91)	2.24 (1.25 – 4.00)	1.90 (1.13 – 3.19)
More than 10 years	5.20 (2.37 – 11.39)	4.66 (2.20 – 9.86)	2.08 (1.20 – 3.61)

5 years or less	Ref	Ref	Ref
Knowledge*			
Poor Knowledge	7.02 (4.20 – 11.75)	7.63 (4.55 – 12.78)	17.16 (9.47 – 31.10)
Good Knowledge	Ref	Ref	Ref
Attitude*			
Poor Attitude	9.22 (5.43 – 15.64)	8.48 (5.05 – 14.25)	30.35 (17.04 – 54.05)
Good Attitude	Ref	Ref	Ref
Practice*			
Bad Practice	45.46 (13.50 – 153.03)	43.78 (13.01 – 147.29)	22.20 (6.65 – 74.06)
Good Practice	Ref	Ref	Ref

*Knowledge refers to the knowledge of hazards of mobile phone use while driving; Attitude refers to the attitude towards mobile phone use while driving; Practice refers to the practice of mobile phone use while driving

Table 3

Multivariate logistic regression assessing the relationship between crash outcomes and knowledge of hazards of mobile phone use while driving, attitude towards mobile phone use while driving, and practices of mobile phone use while driving

Models	Self-Reported Crash Involvement	Self-Reported Crash Injury	Phone-Related Crash Involvement
	Adjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Model 1: Knowledge*			
Poor Knowledge	8.65 (4.57-16.36)	9.58 (5.02-18.30)	24.34 (11.90-49.78)
Good Knowledge	Ref	Ref	Ref
Model 2: Attitude*			
Poor Attitude	13.34 (6.89-25.81)	11.41 (5.99-21.72)	67.87 (30.77-149.72)
Good Attitude	Ref	Ref	Ref
Model 3: Practice*			
Bad Practice	33.63 (8.59-131.65)	28.32 (7.59-105.59)	15.73 (4.48-55.28)
Good Practice	Ref	Ref	Ref

Each model adjusted for age, sex, educational attainment, marital status, and driving experience. *Knowledge refers to the knowledge of hazards of mobile phone use while driving; Attitude refers to the attitude towards mobile phone use while driving; Practice refers to the practice of mobile phone use while driving

Attitude Towards Mobile Phone Use While Driving

About 36% of the sample population had poor attitudes towards mobile phone use while driving (Table 1). Attitude towards mobile phone use while driving was associated with self-reported crash involvement ($p<0.001$), self-reported crash injury ($p<0.001$), and self-reported phone-related crash involvement ($p<0.001$).

When compared to respondents with good attitude, respondents with poor attitude towards mobile phone use while driving were nine times more likely to report that they were involved in a crash (OR: 9.22; 95% CI: 5.43 – 15.64), eight times more likely to report that they sustained a crash injury (OR: 8.48; 95% CI: 5.05 – 14.25), and 30 times more likely to state that they were involved in a phone-related crash. (OR: 30.35; 95% CI: 17.04 – 54.05) (Table 2). After adjusting for sociodemographic and driving characteristics, respondents with poor attitude

towards mobile phone use while driving were 13 times more likely to report that they were involved in a crash (AOR: 13.34; 95% CI: 6.89 – 25.81), eleven times more likely to report that they sustained a crash injury (AOR: 11.41; 95% CI: 5.99 – 21.72), and 68 times more likely to report that they were involved in a phone-related crash (AOR: 67.87; 95% CI: 30.77 – 149.72) (Table 3).

Practice of Mobile Phone Use While Driving

About 9% of the sample population had bad practices of mobile phone use while driving (Table 1). The practice of mobile phone use while driving was associated with self-reported crash involvement ($p<0.001$), self-reported crash injury ($p<0.001$), and self-reported phone-related crash involvement ($p<0.001$).

When compared to respondents with good phone practice, respondents with bad phone practice were 45 times more likely to state that they were involved in a crash (OR: 45.46; 95% CI: 13.50 – 153.03), 44 times more likely to state that they had sustained a crash injury, (OR: 43.78; 95% CI: 13.01 – 147.29), and 22 times more likely to state they were involved in a phone-related crash (OR: 22.20; 95% CI: 6.65 – 74.06) (Table 2).[v] After adjusting for sociodemographic and driving characteristics, respondents with bad phone practice were 34 times more likely to report that they were involved in a crash (AOR: 33.63; 95% CI: 8.59 – 131.65), 28 times more likely to report that they sustained crash injury (AOR: 28.32; 95% CI: 7.59 – 105.59), and 16 times more likely to report that they were involved in a phone-related crash (AOR: 15.73; 95% CI: 4.48 – 55.28) (Table 3).

Discussion

This study investigated the relationship between crash outcomes and the knowledge of mobile phone hazards while driving, the attitude towards mobile phone use while driving, and the practice of mobile phone use while driving. A substantial proportion of the sampled population had been involved in at least one crash event in the past, had incurred crash-related injuries that affected one or more parts of their body, and had experienced mobile phone-related crash events. Drivers with poor knowledge of mobile phone hazards while driving had significantly elevated odds of self-reported crash outcomes compared to those with good knowledge of mobile phone hazards while driving. Similarly, poor attitudes towards phone use while driving and bad practices of phone use while driving were associated with significantly elevated odds of self-reported crash outcomes.

This study reports that about 74% of the sampled Nigerian drivers had been involved in a crash event in the past. Previous studies have reported high proportions of crash involvement among Nigerian drivers (Onyemaechi & Ofoma, 2016; Onyemocho et al., 2013; Uhegbu & Tight, 2021). A study conducted in Benue State, located in the Southern part of Nigeria, reported that 72.5% of sampled commercial motorists had been involved in a mobile phone-related crash event in the past (Onyemocho et al., 2013). A study conducted in Abuja, the capital of Nigeria,

reported that 30% of the sampled population had been involved in crashes within the last six months of the survey (Uhegbu & Tight, 2021). The Federal Road Safety Corps (FRSC) is the national agency saddled with the task of keeping Nigerian roads safe for all users (Federal Road Safety Corps, 2021). Data collected by the FRSC is hugely under-reported (Onyemaechi & Ofoma, 2016). The lack of a comprehensive national trauma directory makes nationwide estimates of crash injuries a challenge (Onyemaechi & Ofoma, 2016). A study that used the Nigerian's trauma registry with two contributing hospitals reported that 69.2% of the trauma cases were due to motor vehicle crash injuries (Cassidy et al., 2016).

This study reports that 26% of drivers had poor knowledge of mobile phone hazards while driving. As of 2003, Akande et al. (2006) reported that about 9% of non-commercial Nigerian drivers are not aware of mobile phone-related crash hazards. A more recent study in Ghana reported that about 8% of the sampled population lack awareness of the hazards of mobile phone use while driving (Donkor et al., 2018). Poor knowledge is associated with 8-fold increased odds of self-reported crash involvement, 10-fold increased odds of self-reported crash injuries, and 24-fold increased odds of mobile phone-related crash involvement among Nigerian drivers.[vi] With increasing uptakes in technology (Pew Research Center, 2017, 2019) and mobile phone addiction (O. Adeyemi, 2021; Kim et al., 2017), there is a need to increase awareness about the hazards of mobile phone use while driving.

In this study, about 36% of drivers had poor attitudes towards phone use while driving. Also, poor attitude towards phone use while driving was associated with 13-fold increased odds of self-reported crash involvement, 11-fold increased odds of self-reported crash injuries, and 68-fold increased odds of self-reported mobile phone-related crash involvement. The AMPUD scale identifies some characteristics drivers with poor attitudes to mobile phone use may possess (O. J. Adeyemi, 2021). Individuals with poor attitudes towards mobile phone use may believe that their mobile phones do not distract them while driving, may approve of the habit of playing games while driving, and may be inclined to take photographs or make videos while driving. Drivers with poor attitudes towards mobile phone use are unlikely to be inclined to keep their phones away while driving or to park safely before engaging in phone activities. Drivers with poor attitudes towards mobile phone use while driving are more likely to engage in live streaming of events on different social media platforms while driving (Feldman, 2016; Jackson, 2021). Since distracted driving involves visual, manual, and cognitive functions (McGehee, 2014), drivers with poor attitudes toward mobile phone use will, unsurprisingly, have increased odds of crash involvement and crash injuries. The severely elevated odds of self-reported mobile phone-related crash involvement and poor attitude towards mobile phone use may suggest attitude alone is a potential candidate for causation (Rothman & Greenland, 2005).

About 9% of the sampled Nigerian drivers were classified as having bad practices of mobile phone use while driving. This classification suggests that this proportion of drivers are more likely to engage in several of the following activities: text, initiate and receive calls while driving, play music and games while driving, scroll through their mobile phones, and browse the

internet while driving (O. J. Adeyemi, 2021). Olumami et al. (2014) reported that among Nigerian commercial drivers, 10% of them agree that they dial frequently and 11% agree that they receive calls frequently while driving. In similar studies, about 8% and 10% of sampled Greek drivers reported that they very often or always make calls on their handheld and handsfree mobile phones, respectively, while driving (Vardaki & Yannis, 2013).[vii] Also, about 11% of sampled U.S. students reported that they talk to someone on their cell phones while driving, while 20% text or read texts while driving (Bazargan-Hejazi et al., 2017). This study reports that bad practice of mobile phone use while driving was associated with 45-fold increased odds of self-reported crash involvement, 44-fold increased odds of self-reported crash injuries, and 22-fold increased odds of self-reported mobile phone-related crash involvement. Earlier studies have reported similar elevated odds of crash involvement or crash injury from mobile phone use while driving (Hickman & Hanowski, 2012; Klauer et al., 2014; Olson et al., 2009; Simmons et al., 2016). Olson et al. (2009) reported that texting and dialing while driving was associated with 23-fold and 6-fold increased odds of crash involvement, respectively. Hickman and colleagues reported that texting, emailing, and accessing the internet while driving, combined, were associated with 163-fold increased odds of crash involvement (Hickman & Hanowski, 2012).

Limitations

This study has its limitations. As this was a cross-sectional study, causation cannot be established. Also, the outcome measures were self-reported, and the possibility of a response bias may exist. Additionally, respondents might have given socially appropriate responses to what extent they use mobile phones while driving since it is illegal in Nigeria to engage in phone activities while driving (Ogundipe, 2018). Another unrelated limitation is that this study was conducted in a state in the South-Western part of Nigeria, and the results may not be generalizable to rural communities or the other regions in Nigeria. Crashes rarely occur in isolation. There may be other risky driving behaviors (such as driving under the influence of drugs and alcohol, speeding, driving inattention) and road environmental characteristics (such as road type, adverse weather conditions, the time of the day) that contribute to the occurrence of crashes and crash injuries. This study did not control for these characteristics. Despite these limitations, this is one of the few studies to use the knowledge, attitude, and practice model to assess mobile phone distracted driving among Nigerian drivers. Also, this study adds to the crash injury literature by providing estimates of the association of crash outcomes and the knowledge of mobile phone hazards, attitude towards mobile phone use, and the practices of phone use while driving among Nigerian drivers.

Conclusion

A substantial proportion of Nigerian drivers have been involved in motor vehicle crashes and have sustained injuries from such events. During a driving event, the knowledge of mobile phone hazards, attitude towards phone use, and the practices of mobile phone use are significant risk factors for self-reported crash involvement, crash injuries, and mobile phone-related crash

involvement. There is a need for greater awareness and intervention aimed at improving knowledge, influencing attitude, and changing the practices around mobile phone use among Nigerian drivers.

References

Adeloye, D., Thompson, J. Y., Akanbi, M. A., Azuh, D., Samuel, V., Omoregbe, N., & Ayo, C. K. (2016). The burden of road traffic crashes, injuries and deaths in Africa: a systematic review and meta-analysis. *Bulletin of World Health Organization, 94*(7), 510-521A. https://doi.org/https://doi.org/10.2471/BLT.15.163121

Adeola, R., Omorogbe, A., & Johnson, A. (2016). Get the Message: A Teen Distracted Driving Program. *Journal of Trauma Nursing, 23*(6), 312-320. https://doi.org/10.1097/jtn.0000000000000240

Adeyemi, O. (2021). The Association of Mobile Phone Addiction Proneness and Self-reported Road Accident in Oyo State, Nigeria. *Journal of Technology in Behavioral Science*. https://doi.org/10.1007/s41347-021-00193-8

Adeyemi, O., & Issel, M. L. (2021). Establishing a Theoretical Association between the Need for Social Connectedness and Distracted Driving. *PsyArXiv.* https://doi.org/10.31234/osf.io/35wbk

Adeyemi, O. J. (2021). Mobile phone use while driving: Development and validation of knowledge, attitude, and practice survey instruments. *Journal of Safety Research*, 77, 30-39. https://doi.org/10.1016/j.jsr.2021.01.004

Afuwape, O. O., Alonge, T. O., & Okoje, V. M. (2007). Pattern of the cases seen in the accident and emergency department in a Nigerian Tertiary Hospital over a period of twelve months. *Nigerian Postgraduate Medical Journal, 14*(4), 302-305. https://pubmed.ncbi.nlm.nih.gov/18163138/

Akande, T., & Ajao, M. (2006). Awareness of hazards and use of GSM mobile phone among non-commercial drivers in Ilorin, Nigeria. *Annals of African medicine, 5*(4), 166-169. http://www.bioline.org.br/pdf?am06039

Altmann, T. K. (2008). Attitude: a concept analysis. *Nursing Forum, 43*(3), 144-150. https://doi.org/10.1111/j.1744-6198.2008.00106.x

Amaya, R. M. R., & Pinto, S. M. B. (2016). Knowledge, attitudes and practices of occupational risks in Colombian taxi drivers. *International Journal of Occupational Safety and Ergonomics, 22*(1), 152-158. https://doi.org/10.1080/10803548.2015.1111712

Arosanyin, G., Olowosulu, A., & Oyeyemi, G. (2013). An examination of some safety issues among commercial motorcyclists in Nigeria: a case study. *International Journal of Injury Control & Safety Promotion, 20*(2), 103-110. https://doi.org/10.1080/17457300.2012.686040

Bazargan-Hejazi, S., Teruya, S., Pan, D., Lin, J., Gordon, D., Krochalk, P. C., & Bazargan, M. (2017). The theory of planned behavior (TPB) and texting while driving behavior in college students. *Traffic Injury Prevention, 18*(1), 56-62. https://doi.org/10.1080/15389588.2016.1172703

Benedetto, A., Calvi, A., & D'Amico, F. (2012). Effects of mobile telephone tasks on driving performance: a driving simulator study. Advances in Transportation Studies, 26(26), 29-44. http://onlinepubs.trb.org/onlinepubs/conferences/2011/RSS/1/Benedetto,A.pdf

Bergmark, R. W., Gliklich, E., Guo, R., & Gliklich, R. E. (2016). Texting while driving: the development and validation of the distracted driving survey and risk score among young adults. *Injury Epidemiology, 3*(1), 7. https://doi.org/10.1186/s40621-016-0073-8

Caird, J. K., Johnston, K. A., Willness, C. R., & Asbridge, M. (2014). The use of meta-analysis or research synthesis to combine driving simulation or naturalistic study results on driver distraction. *Journal of Safety Research, 49*, 91-96. https://doi.org/https://doi.org/10.1016/j.jsr.2014.02.013

Cassidy, L. D., Olaomi, O., Ertl, A., & Ameh, E. A. (2016). Collaborative Development and Results of a Nigerian Trauma Registry. *Journal of Registry Management*, 43(1), 23-28. https://europepmc.org/article/med/27195995

Centers for Disease Control and Prevention. (2021). *Distracted Driving*. Centers for Disease Control and Prevention. https://www.cdc.gov/transportationsafety/distracted_driving/index.html

Donkor, I., Gyedu, A., Edusei, A. K., Ebel, B. E., & Donkor, P. (2018). Mobile phone use among commercial drivers in Ghana: An important threat to road safety. *Ghana Medical Journal, 52*(3), 122-126. https://doi.org/10.4314/gmj.v52i3.3

Federal Road Safety Corps. (2021). *About FRSC*. https://frsc.gov.ng/about-us/

Feldman, J. (2016). Social Media Apps are Too Dangerous to Use While Driving – EndDD.org Joins with the Partnership for Distraction-Free Driving to Launch a Petition to Save Lives. *EndDD.org*. https://www.enddd.org/end-distracted-driving/enddd-in-the-news/social-media-apps-dangerous-use-driving-enddd-org-joins-partnership-distraction-free-driving-launch-petition-save-lives/

Fitch, G. M., Soccolich, S. A., Guo, F., McClafferty, J., Fang, Y., Olson, R. L., Perez, M. A., Hanowski, R. J., Hankey, J. M., & Dingus, T. A. (2013). *The impact of hand-held and hands-free cell phone use on driving performance and safety-critical event risk.* https://www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2013/811757.pdf

GBD 2013 Mortality and Causes of Death Collaborators. (2015). Global, regional, and national age–sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet, 385*(9963), 117-171. https://doi.org/10.1016/S0140-6736(14)61682-2

Gliklich, E., Guo, R., & Bergmark, R. W. (2016). Texting while driving: A study of 1211 U.S. adults with the Distracted Driving Survey. *Preventive Medicine Report, 4*, 486-489. https://doi.org/10.1016/j.pmedr.2016.09.003

Gumicio, S., Merica, M., Luhman, N., Fauvel, G., Zompi, S., & Ronsse, A. (2011). The KAP Survey Model (Knowledge, Attitudes & Practices). *Medicíns du Monde*. https://issuu.com/medecinsdumonde/docs/47-the-kap-survey-model-knowledge-a

Hickman, J. S., & Hanowski, R. J. (2012). An Assessment of Commercial Motor Vehicle Driver Distraction Using Naturalistic Driving Data. *Traffic Injury Prevention, 13*(6), 612-619. https://doi.org/10.1080/15389588.2012.683841

IBM Corp. (2018). *IBM SPSS Statistics for Windows.* In (Version 26) IBM Corp.

Ishida, T., & Matsuura, T. (2001). The Effect Of Cellular Phone Use On Driving Performance. *International Association of Traffic and Safety Sciences Research, 25*(2), 6-14. https://doi.org/https://doi.org/10.1016/S0386-1112(14)60065-0

Jackson, M. (2021). Clubhouse, Distracted Driving and Making Better Decisions. *Marketing and Social Media for Lawyers*. https://streaming.lawyer/2021/03/21/distracted-driving-on-clubhouse/

Kaliyaperumal, K. (2004). Guideline for conducting a knowledge, attitude and practice (KAP) study. *AECS illumination, 4*(1), 7-9. http://v2020eresource.org/content/files/guideline_kap_Jan_mar04.pdf

Kim, H.-J., Min, J.-Y., Kim, H.-J., & Min, K.-B. (2017). Accident risk associated with smartphone addiction: A study on university students in Korea. *Journal of Behavioral Addictions, 6*(4), 699-707. https://doi.org/https://doi.org/10.1556/2006.6.2017.070

Klauer, S. G., Guo, F., Simons-Morton, B. G., Ouimet, M. C., Lee, S. E., & Dingus, T. A. (2014). Distracted driving and risk of road crashes among novice and experienced drivers. *The New England Journal of Medicine, 370*(1), 54-59. https://doi.org/10.1056/NEJMsa1204142

Lagarde, E. (2007). Road traffic injury is an escalating burden in Africa and deserves proportionate research efforts. *PLoS Medicine, 4*(6), 170. https://doi.org/10.1371/journal.pmed.0040170.t001

Lipovac, K., Đerić, M., Tešić, M., Andrić, Z., & Marić, B. (2017). Mobile phone use while driving-literary review [Article]. *Transportation Research: Part F, 47*, 132-142. https://doi.org/10.1016/j.trf.2017.04.015

McDonald, C. C., & Sommers, M. S. (2015). Teen Drivers' Perceptions of Inattention and Cell Phone Use While Driving. *Traffic Injury Prevention,* 16 Supplement 2, 52-58. https://doi.org/10.1080/15389588.2015.1062886

McGehee, D. V. (2014). Visual and cognitive distraction metrics in the age of the smart phone: A basic review. *Annals of Advances in Automotive Medicine,* 58, 15-23. https://www.ncbi.nlm.nih.gov/pubmed/24776223https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4001673/pdf/002.pdf

Nantulya, V. M., & Reich, M. R. (2002). The neglected epidemic: road traffic injuries in developing countries. *BMJ (Clinical research ed.),* 324(7346), 1139-1141. https://doi.org/10.1136/bmj.324.7346.1139

National Highway Traffic Safety Administration. (2012). *Blueprint for ending distracted driving.* https://www.nhtsa.gov/staticfiles/nti/distracted_driving/pdf/811629.pdf

National Highway Traffic Safety Administration. (2017). *Teen distracted driver data.* https://crashstats.nhtsa.dot.gov/API/Public/ViewPublication/812667

National Highway Traffic Safety Administration. (2021). *Distracted Driving*. https://www.nhtsa.gov/risky-driving/distracted-driving

Nevin, P. E., Blanar, L., Kirk, A. P., Freedheim, A., Kaufman, R., Hitchcock, L., Maeser, J. D., & Ebel, B. E. (2017). 'I wasn't texting; I was just reading an email …': A qualitative study of distracted driving enforcement in Washington State. *Injury Prevention, 23*(3), 6-6. https://doi.org/10.1136/injuryprev-2016-042021

Ogundipe, S. (2018). Driving with hands-free illegal in Nigeria — FRSC. *Premium Times*. https://www.premiumtimesng.com/news/top-news/302419-driving-with-hands-free-illegal-in-nigeria-frsc.html

Olson, R. L., Hanowski, R. J., Hickman, J. S., & Bocanegra, J. (2009). *Driver distraction in commercial vehicle operations*. https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/DriverDistractionStudy.pdf

Olumami, H. O., Ojo, T. K., & Mireku, D. O. (2014). Perceiving Risk Of Automobile Drivers On Mobile Phone Usage While Driving In Ibadan Metropolis, Nigeria. *Business Excellence and Management*, 4(3), 24-35. https://beman.ase.ro/no43/2.pdf

Onyemaechi, N., & Ofoma, U. R. (2016). The Public Health Threat of Road Traffic Accidents in Nigeria: A Call to Action. *Annals of Medical and Health Sciences Research, 6*(4), 199-204. https://doi.org/10.4103/amhsr.amhsr_452_15

Onyemocho, A., Johnbull, O. S., Anekoson, J. I., Raphael, A. E., & Shember-Agela, I. (2013). Use of Mobile Phone by Intercity Commercial Motorist in Three Towns in Benue State, Nigeria-A Threat to Road Crash. *International Journal of Sciences: Basic and Applied Research,* 12(1), 198-207. https://core.ac.uk/download/pdf/249333565.pdf

Oyo State Government. (2019). *About Oyo State*. https://oyostate.gov.ng/about-oyo-state/

Pew Research Center. (2017). *Mobile fact sheet*. https://www.pewinternet.org/fact-sheet/mobile/

Pew Research Center. (2019). *Mobile Fact Sheet*. https://www.pewinternet.org/fact-sheet/mobile/

Rothman, K. J., & Greenland, S. (2005). Causation and Causal Inference in Epidemiology. *American Journal of Public Health,* 95(S1), S144-S150. https://doi.org/10.2105/AJPH.2004.059204

Simmons, S. M., Hicks, A., & Caird, J. K. (2016). Safety-critical event risk associated with cell phone tasks as measured in naturalistic driving studies: A systematic review and meta-analysis. *Accident Analysis and Prevention, 87*, 161-169. https://doi.org/https://doi.org/10.1016/j.aap.2015.11.015

Statistica. (2021). *Mobile internet user penetration in Nigeria from 2016 to 2026.* https://www.statista.com/statistics/972900/internet-user-reach-nigeria/

TeenSafe. (2018). *100 Distracted Driving Facts & Statistics For 2018*. https://teensafe.com/100-distracted-driving-facts-statistics-for-2018/

Uhegbu, U. N., & Tight, M. R. (2021). Road User Attitudes and Their Reported Behaviours in Abuja, Nigeria. *Sustainability, 13*(8), 4222. https://www.mdpi.com/2071-1050/13/8/4222

Vardaki, S., & Yannis, G. (2013). Investigating the self-reported behavior of drivers and their attitudes to traffic violations. *Journal of Safety Research, 46*, 1-11. https://doi.org/10.1016/j.jsr.2013.03.001

World Health Organization. (2015). Global status report on road safety 2015. https://www.afro.who.int/sites/default/files/2017-06/9789241565066_eng.pdf

World Health Organization. (2018). *Global Status Report on Road Safety 2018*. In (pp. 403). https://www.who.int/violence_injury_prevention/road_safety_status/2018/en/

World Health Organization. (2020). *The top 10 causes of death*. https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death

World Health Organization. (2021). *Road traffic injuries*. https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries

World Life Expectancy. (2018). *Road Traffic Accidents*. https://www.worldlifeexpectancy.com/cause-of-death/road-traffic-accidents/by-country/

Yannis, G., Laiou, A., Papantoniou, P., & Gkartzonikas, C. (2016). Simulation of texting impact on young drivers' behavior and safety on motorways. *Transportation Research Part F: Traffic Psychology and Behaviour,* 41, 10-18. https://doi.org/https://doi.org/10.1016/j.trf.2016.06.003

About the Research

This thesis was submitted in partial fulfillment of the Master's degree in Public Health at the University of Roehampton, United Kingdom.

Acknowledgment

The author thanks his supervisor, Dr. Tolu Osoba, Department of Public Health, University of Roehampton. Her advising and guidance were instrumental in completing this Master's Thesis. The author thanks Prof. Charlie Reeve, Department of Psychological Science, the University of North Carolina at Charlotte, for his training and guidance on instrument design and validation that informed the analysis of this paper. The author thanks the anonymous reviewer. The reviewer's comments have made this paper better.

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Oluwaseun Adeyemi completed his Ph.D. in Public Health at the University of North Carolina at Charlotte. He obtained an MSc in Trauma and Orthopedics at the University of Edinburgh, MPH in Public Health from the University of Roehampton, London, and a Membership of the West African College of Surgeons in Nigeria. Oluwaseun has authored several articles relating to injury prevention, trauma care, rural health disparities, and COVID-19. He incorporates Spatial Epidemiology in his work to inform policy and practices.

Endnotes

[i] Road crashes may be associated with an increase in road networks and road developments. Additionally, road crashes may be associated with increased travel and increased transit time. There is a paucity of data on the trend of road developments and the volume of miles traveled in Nigeria in the last decade. Also, an increase in the number of motor vehicles may have an association with an increase in the rate of crashes. However, in Nigeria, there is no consistent growth in car sales during this period (see https://www.ceicdata.com/en/indicator/nigeria/motor-vehicles-sales-growth).

[ii] The KMPHD, AMPUD, and PMPUD survey instruments are validated instruments. Details of the instrument are available at https://doi.org/10.1016/j.jsr.2021.01.004. The sample population used to validate the instrument was from the pilot study from the same population of this index study

[iii] In this study, there are three outcome variables -self-reported crash involvement, self-reported crash injury, and self-reported phone-related crash involvement. Conceptually, these variables are correlated. For example, a driver who experienced a crash injury will have experienced a crash and might have experienced a phone-related crash injury. The demographic characteristics of this population should exhibit a similar phone-related crash pattern.

[iv] Knowledge, attitude, and practice were the predictor variables. These variables were separately assessed on three models: Each model has its separate outcomes, which are 1. Self-reported crash

involvement 2. Self-reported crash injury, and 3. Self-reported phone-related crash involvement. The demographic characteristics of the respondents were similar across the domains of crash outcome measures (see Table 1).

[v] One might wonder how 1% of the population engaged in the bad practice of mobile phone use while driving has a 45-fold increased odds of crash injury. The author presents a simplified example of the statistical dynamic that is occurring. Let us imagine that there are 1000 drivers and 10 out of the 1000 (1%) consistently engage in drunk driving. The other 990 never engage in drunk driving. We ask all of them the question, have you ever had a crash and the response is tabulated (please see the table below). 9 out of 10 (90%) of those that take alcohol had a crash. 10 out of the 990 that never took alcohol had a crash. The odds of a crash are calculated as a*d/b*c = 882. This example shows the principle of calculating the odds of an event. This principle holds for this study. The proportions across the categories are different and the logistic regression model used in the study adjusted for potential confounders.

Variable	Crash	No Crash	Total
Alcohol present	9 (a)	1 (b)	10
No Alcohol	10 (c)	980 (d)	990
No Alcohol	10	980	990

[vi] Knowledge should influence practice. If the knowledge is poor, the practice may be poor and that might increase risk. With regards to this study, it is plausible that knowledge of phone safety (predictor variable) will be associated with phone-related crashes (one of the three outcome variables). The question, therefore, would be why is knowledge of phone safety associated with crash events or crash injuries that may not be directly linked to phone use? First, the three outcome variables in this study are conceptually related (see ii above). From a statistical point of view, the intrinsic correlation may explain the reason why knowledge of phone safety will be significantly associated with crash events or crash injuries. Secondly, crash events are rarely caused by a single factor. A single crash may be caused by the coexistence of weather factors, night driving, phone use, lack of streetlights, speeding, and drunk driving. In such a case, phone use is a factor - among other factors. A survey respondent will select all these factors as factors associated with the crash event in perspective. Supposing there is another crash with all these factors present excluding phone use while driving, the same respondent would state yes, he has had a crash before and his past crashes were associated with phone use (although one of the two crashes was associated with phone use). The survey did not ask for the number of crash events and which factors were specific to each crash. Identifying the number of crashes will not change the knowledge of phone safety, which if it were poor for the first crash, would remain so for the second crash assuming there was no change in knowledge. The conceptual correlation between that self-reported crash involvement, self-reported crash injury and self-reported phone-related crash involvement may be viewed as a nest of events occurring within another event. Another way to conceptualize the three outcome variables is thinking of the self-reported crash involvement as a large bubble "C", and self-reported phone-related crash involvement as a smaller bubble "c1" within the larger bubble "C" and self-reported crash injury as a smaller bubble "c2", separate from the bubble "c1" but within the larger bubble "C".

[vii] From an epidemiological standpoint, the 9% reported in the index study (the proportion of Nigerian drivers with bad practices of phone use while driving), the 10% reported in Olumami's article (the proportion of Nigerian commercial drivers that dial and text while driving), and the 10% reported in the Vardaki and Yaddis article (the proportion of Greek drivers that make calls

on hands-free mobile phones while driving) are similar. These values are proportions and not the actual number. The population sizes of the study conducted in Nigeria and Greece are different and the raw counts would not be a proper way to present the data. The author used proportions here to show the pattern of semblance or non-semblance. The intention is not to create any inference