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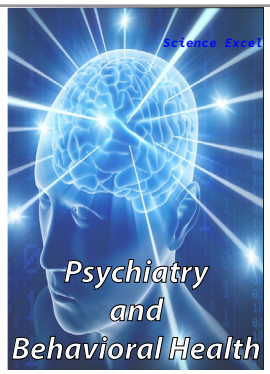

Post-Traumatic Stress Symptoms Among Secondary School Student Survivors in The Aftermath of A Road Traffic Accident in Lagos, Nigeria

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Abstract

Background: Although distress after road traffic accidents (RTAs) can persist for several months, the emotional needs of children and adolescents involved in RTAs are rarely recognized and they hardly have any planned intervention.

Objectives: We aimed to screen, assess and diagnose Post-traumatic stress symptoms (PTSS) among secondary school students in the aftermath of an RTA that they experienced either as survivors or as witnesses. While doing this, we assessed the incidence of PTSS 4 weeks after an RTA and examined the possible adolescent characteristics predictors of PTSS following RTA.

Methods: A cross-sectional survey of 107 secondary students who either survived/witnessed the RTA were consecutively enrolled. PTSS were assessed using the Children's Revised Impact of Event Scale (CRIES-8), sociodemographic variables were assessed using a proforma questionnaire while depressive and anxiety symptoms were assessed using the Short Mood and Feelings Questionnaire and Spence Children's Anxiety Scale respectively.

Results: PTSS among children/adolescents who either witnessed or survived an RTA was 33.0%. Independent predictors of PTSS among the children/adolescents were decreasing age, present academic class (senior secondary), maternal level of education (lack of tertiary education), and presence of clinically significant anxiety and depressive symptoms.

Conclusion: Routine consideration of the psychological impact of road traffic accidents should receive the same priority as screening for physical injury. This indicates that clinicians need to link these patients to the psychiatry clinic as it is also helpful for better physical rehabilitation.

Keywords

Post-traumatic stress symptoms; Road traffic accident; Adolescents; Nigeria.

Introduction

Road traffic injuries constitute a major health and development problem the world over but especially in the African Region where about 90% of road traffic deaths occur [1]. Road traffic injuries are the leading cause of death among people aged between 15 and 29 years [2]. In Nigeria, though the number of vehicles is one of the lowest in the world, injuries and deaths resulting from Road Traffic accidents {RTA} are on the rise. RTA is Nigeria's third leading cause of overall death and the most common cause of disability [3].

Besides causing deaths and injuries, RTAs can put survivors or witnesses at an increased risk for a wide range of psychiatric disorders particularly, post-traumatic stress disorder [4]. Post-traumatic stress disorder (PTSD) occurs after exposure to actual or threatened death, serious injury, or sexual violence. It is characterized by recurrent, involuntary, and intrusive distressing memories of the traumatic event and dissociative reactions [5]. PTSD symptoms are higher in traumatic events compared to non-traumatic events [5].

RTA is the most common traumatic event in the world that children and adolescents face [6]. There is substantial proof that children and adolescents can suffer significant and long-lasting psychological distress following everyday RTAs in recent years [6]. The estimates of the prevalence of PTSD among road traffic injured or exposed (who witnessed an RTA) children and adolescents vary between 4.9% to 34.5% across individual studies [7-10]. The difference in prevalence may be due to variations in tools used to assess for PTSD, the interval between traumatic events and assessment of PTSD as well as sample baseline characteristics such as type of RTA, gender, social support, and injury severity [11].

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Reported risk factors associated with PTSD in children and adolescents after an RTA can be classified into three categories. First, the quality of the traumatic event, followed by the characteristics of the adolescent, and lastly, features of the adolescent recovery surrounding [6]. As regards the quality of the traumatic event, the association with Post Traumatic Stress Symptoms has not been consistently demonstrated by individual studies [8,12,13]. Hence, minor crashes can evoke marked distress.

Concerning adolescent characteristics, several studies have found an association between PTSSs and pre-traumatic functioning [14,15] and previous experience of trauma [16]. Also, the female gender has been equivocal as a risk factor, and findings have been inconsistent) [13,16,17]. Finally, the important role of cognition in predicting PTSD has consistently been demonstrated. Most studies confirmed that the adolescent's subjective perceptions of life threats or threats to physical integrity were significant predictors of PTSSs [17,18].

The role of the adolescent's recovery surroundings following RTA has only been studied rarely. Adolescents with accidental injuries were at higher risk of PTSS if the parents showed signs of acute distress after the incident [13]. Moreover, the relationship between child RTA victims and their caregivers can be complex, particularly if a parent was involved in the accident or even caused [19].

Overall, the main risk factors for PTSD in children include parents' education level, the presence of brain injury, effective family care, general treatment after RTI, and early psychological intervention. A few factors such as the injury severity and medical characteristics are under debate whether they are significantly related to PTSD or posttraumatic stress syndrome (PTSS) [8,12].

Although distress after RTAs can persist for several months, the emotional needs of children and adolescents involved in RTAs are rarely recognized and they hardly have any planned intervention [20]. Therefore, the aim of the study was two-fold

1. We aimed to screen, assess and diagnose PTSS among secondary school students in the aftermath of an RTA that they experienced either as survivors or as witnesses.
2. While doing this, we assessed the incidence of PTSS 4 weeks after an RTA and examined the possible adolescent characteristics predictors of PTSS following RTA.

Methods and materials

Description of the traumatic event

On December 7, 2021, at about 4 pm, a truck (Heavy goods vehicle) lost control and plunged into students who were on their way home outside their school compound in Lagos, Nigeria [21]. Those affected by the accident were students of four secondary schools located in the compound. Three students died and several students sustained varying degrees of injury that required hospitalization [21]. In response to the accident, the Lagos state government shut down all the schools within the compound for about two months.

Participants

The students of the four secondary schools were assessed in the aftermath (4 weeks) of the RTA. The inclusion criteria were adolescent students who witnessed the RTA or sustained physical injuries from the RTA, who gave assent, and whose guardians gave consent for their participation in the study. While adolescent students who sustained a severe head injury and those with a previous history of mental and behavioral problems were excluded.

Study design

It was a cross-sectional survey with a non-random consecutively sampling technique.

Study instruments

1. Sociodemographic questionnaire- this included information on the demographic variables (Age, gender, religion, and class at school); social variables (marital status of parents, highest level of parental education, parental employment status, and family size), and self-rated perception of health
2. The 8-item Children's Revised Impact of Event Scale (CRIES-8)- is a screening tool for post-traumatic stress symptoms in children and young people aged 8 to 18 years with reading abilities that are sufficiently developed to understand and interpret the items. No parental version of the tool exists. It takes between 5-10 minutes to complete. The scale is self-administered and consists of 8 items, 4 measuring intrusion and 4 measuring avoidance. The items are scored on a four-point scale; "not at all" receive 0 scores, "rarely" sums 1 point, "sometimes" adds 3 points, and "often" computes 5 points. The intrusion and avoidance subscales are obtained by counting the point for the appropriate subscale item. The total score indicated the severity of a child's post-traumatic symptoms with a range from 0 to 40. Earlier studies have shown that the revised scale has reasonably good psychometric properties [22,23]. A score of 17 and above has been confirmed as the most effective cut-off score for screening cases of PTSD [22,23]
3. Short Mood and Feelings Questionnaire (SMFQ): It is a 13-item self-report questionnaire designed to measure core depressive symptomology in children and adolescents aged 6- 17 years old. More specifically, it assesses the presence of affective and cognitive symptoms of depression that have been experienced in the past 2 weeks. Items are rated on a 3-point Likert scale (not true = 0; sometimes true = 1; not true = 2). Example items include 'I felt miserable or unhappy' and 'I cried a lot'. Scores are calculated by summing the point values on each item response. Total SMFQ scores range from 0 – 26. There are no prescribed cut points for the SMFQ. Instead, it is advised that the user utilise their discretion and clinical judgement to assess scores on a case-by-case basis [24]. However, it has been suggested that higher scores, such as those over 12, suggest a greater severity of depressive symptoms and may indicate the presence of depression [25]. The SMFQ has also been shown to be a useful measurement of clinical remission [25].
4. The Spence Children's Anxiety Scale (SCAS) developed by Spence [26], is a self-report measure designed to assess the severity of anxiety symptoms in children relating to separation anxiety, social phobia, obsessive-compulsive disorder, panic agoraphobia, generalised anxiety, and fears of physical injury. The scale consists of 44 items that can be filled out by the child. Thirty-eight of the items reflect specific symptoms of anxiety,

while 6 relate to positive, filler items to reduce negative response bias, such as, "I am the most popular amongst other kids my age". The scale is quick and easy to administer, taking only 10 minutes. Items are consistent with specific DSM-IV anxiety disorders. Participants are asked to rate the degree to which they experience a symptom on a 4-point frequency scale, Never, Sometimes, Often, and Always. Sample items from the separation anxiety subscale include, "I worry about being away from my parents" and "I feel scared if I have to sleep on my own". Sample items from the obsessive-compulsive subscale include, "I have to keep checking that I have done things right (like the switch is off, or the door is locked)" and "I have to do some things in just the right way to stop bad things happening" [26]. The total score may be computed by adding together all the subscale scores. The sub-scale scores are computed by adding the individual item scores on the set of items within that domain.

Procedure

The data was collected as an integral part of the service-oriented psychological project aftermath of the RTA. It is to provide psychological support to the students of the schools, identify vulnerable (emotionally disturbed, for example, depression, anxiety, and PTSS) students, and guide treatment and service planning. Issues of voluntary participation, freedom to respond independently, confidentiality, and seeking clarification during the assessment were discussed with participants at the beginning of the assessment. Thereafter participants were given the questionnaires to fill out and return after completion. Due to concerns about the reading and understanding ability of junior secondary students, teachers were consulted and it was decided that questions would be read aloud to this group while the senior secondary students were encouraged to ask for help if needed. However, none of the adolescents did so.

Ethical consideration

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committee on human experimentation with the Helsinki Declaration of 1975, as revised in 2008. The study protocol was approved by the institutional review board of the participating institution. Informed assent and parental/guardian consent were obtained from all participants.

Statistical analysis

Statistical analysis was carried out with Statistical Package for the Social Sciences (SPSS) version 23.0 for windows. Data were coded, entered into a statistical package, and cleaned. Categorical variables were summarised with frequencies and percentages while continuous variables were summarised with their mean, mode, range, and standard deviation.

The Chi-square Test of Independence was used to explore a possible association between categorical variables and post-traumatic stress symptoms. On the other hand, the Mann-Whitney U test was conducted to determine the association between continuous variables and post-traumatic stress symptoms.

The relationship between socio-demographic variables, clinical variables, and post-traumatic stress symptoms was further investigated with Logistic Regression analyses using the Backward Stepwise Method, and post-traumatic stress symptoms were the dependent variable. For all statistical tests, the level of significance was set at $p \leq 0.05$. Although, variables with a p-value less than 0.1 were included in the regression analysis.

Results

A total of 107 adolescents met the inclusion criteria for the study. All of the adolescents and their guardians gave consent. The response rate was 100%, and there were no cases of missing questionnaires.

Characteristics of the sampled population

There was an almost equal distribution of gender and present academic class in the sample, with the majority aged 15 years and above (N=67.0, 63.0%). A high proportion of the participants reside with both parents (N=83.0, 78.0%), have parents who are married to each other (N=88.0, 82.0%), and come from a monogamous family setting (N=79.0, 74.0%). Most of the children have parents/caregivers who are both employed (N=64.0, 60.0%). The majority (79.0%) of the children rated their perception of their health to be good. The mean CRIES score was 13.0 ± 6.0 and 35 children met the criteria (at least a score of 17 on the CRIES) of PTSS at four weeks. Thirty-three (35.0%) children and adolescents developed depression based on the SMFQ and the mean anxiety scores based on the SCAS-S were 19.0 ± 11.0. Please see Table 1 below for more details.

Prevalence and correlates of post-traumatic stress symptoms

Descriptive statistics for post-traumatic stress symptoms as measured by the CRIES scores are provided in Table 1. Of the 107 respondents, 35 (33.0%) had scores in the clinical range of PTSS (≥ 17 on the CRIES) after 4 weeks of the RTA. The Chi-square Test of Independence was used to explore a possible association between categorical variables and post-traumatic stress symptoms. On the other hand, the Mann-Whitney U test was conducted to determine the association between continuous variables and post-traumatic stress symptoms.

The following socio-demographic variables were found to have a significant association with age, present academic class, orphanhood, parental employment status, and maternal level of education. While significant clinical variables were; anxiety and depressive symptoms. The rest of the details can be found in Tables 2 and 3.

Predictors of PTSS in children and adolescents

The relationship between variables of interest and post-traumatic stress symptoms was further investigated with Logistic Regression analyses using the Backward Stepwise Method, and post-traumatic stress symptoms were the dependent variable. This analysis was done by including all independent variables from the univariate analysis with P-values less than 0.05. In addition, variables with P-values less than 0.1 were also included in this analysis to account for the possible influence of confounders in the univariate analysis.

Concerning socio-demographic variables, with increasing age, the risk of having post-traumatic stress symptoms was increased by a factor of 0.7 (meaning, age is inversely associated with PTSS). Post-traumatic stress symptoms were decreased by a factor of 0.1 and 0.4 in junior secondary school students (meaning senior secondary students are 8.3 times more likely to be associated with PTSS than junior secondary

Table 1. *Sociodemographic and clinical characteristics of the sampled population*

Qualitative Variables	Frequency N (%)	Quantitative Variables	Frequency N (%)	Mean (±SD), Range
Gender		**Number of Siblings**		
Male	54.0 (51.0)	≤ 2	50.0 (47.0)	2.0 ±1.0
Female	53.0 (49.0)	>2	57.0 (53.0)	1.0 -3.0
Class		**Age (Years)**		
Junior	55.0 (52.0)	≤15	67.0 (63.0)	15.0 ± 2.3
Senior	52.0 (48.0)	>15	40.0 (37.0)	10.0 -17.0
Orphanhood		**Number of Wives Father Has**		
No	95.0 (88.0)	<3	97.0 (91.0)	1.0 ±1.0
Father Dead	6.0 (6.0)	≥3	10.0 (9.0)	1.0 -3.0
Mother Dead	3.0 (3.0)			
Both Parents Dead	3.0 (3.0)			
Child Resides With		**Post-traumatic stress symptoms measured by CRIES**		
Both Parents	83.0 (78.0)	Yes (≥ 17)	35.0 (33.0)	13.0 ± 6.0 0 -24
Mother Only	12.0 (11.0)	No (< 17)	72.0 (67.0)	
Father Only	2.0 (2.0)			
A relative	10.0 (9.0)			
Marital Status of Parents		**Short Mood and Feelings Questionnaire**		
Married	88.0 (82.0)	Yes	33.0 (31.0)	9.0 ±7.0
Separated/Divorced	7.0 (7.0)	No	74.0 (69.0)	0.0 -26.0
Widow/Widower	10.0 (9.0)			
Co-Parents (Unmarried)	2.0 (2.0)			
Family Setting		**Short Spence Children Anxiety Scale**		
Monogamous	79.0 (74.0)		----------	19.0±11.0
Polygamous	9.0 (8.0)			0.0 – 57.0
Not Applicable (Unmarried/Widow/Widower/Separated/Divorced)	19.0 (18.0)			
Fathers' Level of Education				
No formal		5.0 (5.0)		
Primary		7.0 (6.0)		
Secondary		49.0 (46.0)		
University		46.0 (43.0)		
Mothers' Level of Education				
No formal		8.0 (7.0)		
Primary		12.0 (11.0)		
Secondary		38.0 (36.0)		
University		49.0 (46.0)		
Parents Employment Status				
Only Father Employed		25.0 (23.0)		
Only Mother Employed		15.0 (14.0)		
Both Employed		64.0 (60.0)		
Both Unemployed		3.0 (3.0)		
Self-rated perception of health				
Good		84.0 (79.0)		
Fair		14.0 (13.0)		
Poor		9.0 (8.0)		

N, proportion; (%), percentage; SD, standard deviation

Table 2. *Test of association between post-traumatic stress symptoms, sociodemographic variables, and severity of depressive symptoms using a chi-square test*

Variables	PTSS absent (N=72) n (%)	PTSS present (N=35) n (%)	Total (N= 107)	χ2 (df), P-value
Orphanhood				
Yes	8 (67%)	4 (33%)	12 (11%)	0.42 (1)
No	64 (67%)	31 (33%)	95 (89%)	0.04*
Maternal Education				
Tertiary	38 (78%)	11 (22%)	49 (46%)	3.51 (1)
Non-Tertiary	34 (59%)	24 (41%)	58 (54%)	0.03
Parental Employment Status				
Both parents	42 (66%)	22 (34%)	64 (60%)	0.24 (1)
None/One parent	30 (70%)	13 (30%)	43 (40%)	0.07
Academic Class				
Junior	42 (76%)	13 (24%)	55 (51%)	4.63 (1)
Senior	30 (58%)	22 (42%)	52 (49%)	0.02
Depression				
No	48 (65%)	26 (35%)	74 (69%)	8.64 (1)
Yes	24 (73%)	9 (27%)	33 (31%)	0.01

χ2, Chi square value; df, Degree freedom; bold p-value, statistical significance; n, proportion; %, percentage; *, Fisher's Exact; PTSS, post-traumatic stress symptoms

Table 3. *Test of association between post-traumatic stress symptoms, age, and severity of anxiety symptoms using the Mann-Whitney U test.*

VARIABLE	Mean Rank	Median	Mann-Whitney U	Z P-Value (Sig)
Age				
PTSS present	58	15	1118	-0.95
PTSS absent	52	14		0.03
Anxiety				
PTSS present	66	22	854	-2.69
PTSS absent	48	16		0.01

PTSS, post-traumatic stress symptoms

Table 4. *Regression analysis predicting PTSS at 4 weeks*

VARIABLE	B	SE	Wald	Df	Sig	Exp. B	95% CI LB	95% CI UB
Age	-0.3	0.18	2.75	1	0.01	0.74	0.53	0.88
Junior Class	-2.13	0.84	6.47	1	0.01	0.12	0.02	0.61
Mother having Tertiary Education	-0.89	0.43	4.22	1	0.04	0.41	0.18	0.55
Depressive Symptoms	1.3	0.61	4.5	1	0.03	0.27	0.08	0.78
Anxiety Symptoms	0.06	0.02	6.22	1	0.01	2.06	2.01.	2.11

students) and those having a mother with tertiary education (meaning children of mothers without tertiary education are 2.4 times more likely to be associated with PTSS than children of mothers with tertiary education) respectively. For clinical variables, the odds of having post-traumatic stress symptoms were increased by a factor of 0.3 and 2 in those with depressive and anxiety symptoms respectively. The rest of the details can be found in Table 4.

Discussion

The present study was designed as an exploratory investigation. Although the sample was small and the follow-up period was short, the results give evidence of a neglected but important clinical subject and highlight the need for further research. The prevalence of clinically relevant PTSS among children/adolescents who either witnessed or survived an RTA was 33.0%. PTSS was significantly associated with age, present academic class of the students, orphanhood, employment status of their parents, maternal level of education, presence of clinically significant anxiety, and depressive symptoms. However, independent predictors of PTSS among the children/adolescents were decreasing age, present academic class (senior secondary), maternal level of education (lack of tertiary education), and presence of clinically significant anxiety and depressive symptoms..

Prevalence of PTSS

The Prevalence rate of 33.0% of clinically relevant PTSS at 4 weeks reported in the study is consistent with earlier findings that suggest that approximately 30% of children involved in everyday RTAs will meet diagnostic criteria for PTSD, 4 weeks post-accident [7,10, 18, 27] Although our prevalence rate was lower than the study by Fekadu et al done in Ethiopia, Africa which reported 46.5% [11]. The plausible reason for the difference may be due to participant selection (in the current study we included both witnesses and survivors unlike the other study that included admitted survivors only). Also, the prevalence rate of 33.0% of PTSS in the study is higher than the 4.1% reported among internally displaced children/adolescents in Nigeria [28]. The possible explanation for this difference is that compared to other traumatic events, road traffic accidents could positively predict children/adolescents' PTSS at different time points post-RTA [6]. .

Age

Children/adolescents' experience of danger, memory of trauma, and understanding of trauma may vary with their ages. The findings from the study showed that decreasing the age of respondents independently predicted increased PTSS among respondents. This result is consistent with another study that reported that 1 month after the earthquake, the incidence of PTSD in survivors under 15 years of age was significantly higher than in survivors over 15 years [29]. However, some studies have reported a positive/direct association between age and PTSD in children/adolescents [30]. Future studies are suggested to look into these possible associations and explain with caution due to the complex nature of PTSS in children/adolescents..

Higher class (Senior secondary school)

Students in higher class (senior secondary class) are 8.3 times more likely to develop PTSS than students in Junior secondary class. This is consistent with other studies (Ehlers et al., 2003; McDermott and Cvitanovich, 2000)[17,18]. The reason may be due to cognitive changes associated with formal operational thought which allow students in higher classes to respond to PTSS with a range of behavioural (avoidance/ safety seeking) and cognitive (appraisal of symptoms) strategies that maintain PTSS while trying to control the current threat [31]. Thus, misunderstanding the RTA can lead to secondary trauma.

Maternal lower educational level

Children of mothers without tertiary education are 2.4 times more likely to develop PTSS than children of mothers with tertiary education. This may be due to the effect of a poor level of education influencing the parents' response after the trauma which may affect the children/adolescents' judgement of the event and their coping style is imitated by children/adolescents. In addition, given mothers are primary caregivers, maternal poor psychological states and continued focus on the RTA could be a risk factor for children/adolescents' PTSS.

Comorbid clinically significant anxiety and depressive symptoms

Children/adolescents who developed clinically significant anxiety and depressive symptoms following RTA will most likely develop PTSS more than students who did not develop anxiety and depressive symptoms. Depression, anxiety, as well as PTSS, can have overlapping symptoms. Also, the relationship may be bi-directional with one of them precipitating the other. This finding has been reported in other studies [32,33].

Limitations

This study has some limitations. First, our study was cross-sectional, and we should be careful in making causal inferences. Second, this study did not assess data on the premorbid functioning of children/adolescents. We therefore may have missed an important additional predictor of PTSS and PTSD. Third, the follow-up period was not long enough to investigate the delayed onset of PTSD or chronic pathology.

Strengths

Notwithstanding these limitations, this study adds to the understanding of the prevalence and predictors of PTSS in children/adolescents who experience RTA in Nigeria. Also, the 100% participation rate.

Conclusion

About a third of RTA children/adolescent survivors develop PTSS after a month, but the treatment is merely focused on physical rehabilitation. Routine consideration of the psychological impact of road traffic accidents should receive the same priority as screening for physical injury. This indicates that clinicians need to link these patients to the psychiatry clinic as it is also helpful for better physical rehabilitation. Also, parents and children need information as to the possible reactions that may follow traumatic events. This may help parents of younger children to recognise that changes in behaviour may be trauma related rather than deliberate wilfulness or naughtiness. Similarly, older children might find such information reassuring and it may help them understand that they are experiencing a common reaction to an abnormal event. Information leaflets, routinely distributed to children and parents attending the Accident and Emergency following a trauma would ensure that parents and children are aware of and prepared for any possible adverse psychological effects that might emerge.

Recommendation

We appreciate the students who took the time to participate in the survey.

Conflict of interest

The authors declare that they have no financial or personal relationship that may have inappropriately influenced them in writing this article.

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