ORIGINAL ARTICLE

Perception of Nigerian athletes of the use of mouth guards to prevent the stresses of sports injury

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Objective: The perception of Nigerian athletes of the use of mouth guards to prevent the stresses of sports injuries was examined using psychological, sociological, and physical stress variables.

Methods: The descriptive survey research design was used in this study. Participants (n=333) were selected using the purposive random sampling technique and data were collected using the 4 point Likert type instrument. The coefficient α was used to determine the reliability of the instrument with $r=0.79$ for psychological, $r=0.66$ for physical, and $r=0.74$ for sociological stress.

Results: The result reveals that female athletes perceived the use of mouth guards as being more important to prevent the stresses of sports injuries than male athletes, while athletes who had used mouth guards for longer periods also perceived them as being more important to prevent the stresses of sports injuries compared to those who had used them less. The result also revealed a significant difference ($p<0.05$) among the various sport groups as independent variables on the psychological and physical stress variables. Scheffé post hoc analysis was used to identify the group where significant difference was found.

Conclusions: The study concluded that since the impact of injury is perceived to affect the cognitive function of athletes, athletes should be educated on the use of mouth guards in order to reduce the incidence of oral and dental injuries to the barest minimum.

The perception of a substantial imbalance between environmental demands and response capability is associated with stress, especially when failure to meet the demand is seen as having important consequences for the desired goal. Minor aches and pains are a routine part of sport. According to Heil,¹ they may be frustrating and aggravating but are generally accepted as being part of the game, as is more serious injury resulting from participation in sport.

The disruptive influence of injury on the athlete's life is well known. Initial theoretical and applied perspectives on the psychological impact of injury are supported by studies.^{2–3} There is temporary loss of the ability to participate in a highly valued activity which is a significant threat to continued success in sport. This can challenge the athlete's self perception at a very fundamental level in that the perception of worth as an athlete and perception of one's self as competent and effective are undermined.

The stresses of injury as they influence the physical, social, and psychological well being of athletes are of the utmost importance to psychologists and physicians. Ultimately, the impact of injury is the net effect of the injury itself and the athlete's coping resources.¹ How these balance out determines how traumatic the injury is. Dental injuries associated with sport in Britain with children under 15 years of age account for only 10% of all injuries.⁴ In the majority of cases, the front teeth of the upper jaw are affected, and more than one tooth has been reported to be damaged.⁵ It is rare that a dental injury heals spontaneously without treatment. Such injuries in children should be considered as serious, since injuries to the teeth and jaws that are not fully developed can lead to their being adversely affected for life.

The impact to the maxilla and/or mandible during sport is usually by a direct blow from a fist, elbow, or knee. The injury patterns sustained have led to the development of mouth guards, which according to Walkden,⁶ are psychological assets to contact sport athletes. The National Collegiate Athletic Association in America made it mandatory in 1990

for all players to wear yellow mouth guards so that they would easily be visible to all players, officials, and coaching staff.

It was estimated⁵ that 2.26% of all American football wounds involved injuries to the dental or facial tissues. Studies in other sports have shown a dramatic reduction in the number of dental injuries when a mouth guard was worn.^{7–8} In a recent study,⁹ it was asserted that there is evidence that mouth guards are effective in protecting against concussion and injuries to the cervical spine. The study further states that there is a high level of acceptance of mouth guards among players, an increasing number of whom are regularly wearing mouth guards. This was found to be especially true among elite players, but acceptance and wearing rates were moderately high among club players as well.

Injury is a daily concern in sport and is a broad and far reaching problem especially regarding the stress associated with it. Dento-facial injuries in sport are increasing among athletes in Nigeria and very few Nigerian athletes use mouth guards to prevent the injuries and the associated stress. This study therefore examined the perceptions of Nigerian athletes of the use of mouth guards to prevent the stresses of sports injuries using a multidimensional analytical approach.

METHODS

Participants

This study involved 500 participants sampled from the Nigerian National Sport Festival *Edo 2002*, 333 of whom completed and returned their questionnaires. The National Sport Festival is a biennial sporting competition for elite athletes. The 333 participants consisted of 136 male and 197 female athletes. The mean (SD) age of the male athletes was 24.74 (6.72) years, while the mean age of the female athletes was 23.05 (4.37) years.

The athletes' involvement in sport is shown in table 1. The participants were categorised into young and old based on

Table 1 Frequency and percentages of athletes involved in various sports

Sport	Frequency	Percentage
No response	9	2.7
Tennis	8	2.4
Football	17	5.1
Basketball	12	3.6
Taekwondo	9	2.7
Karate	27	8.1
Weight lifting	2	0.6
Cycling	1	0.3
Judo	37	11.1
Table tennis	10	3.0
Badminton	8	2.4
Wrestling	2	0.6
Handball	29	8.7
Boxing	120	36.0
Volleyball	1	0.3
Hockey	34	10.2
Cricket	7	2.1
Total	333	100.0

the duration of their use of mouth guards. The athletes who had been using mouth guards for 1–4 years were considered young athletes, while those who had been using mouth guards for 5 years or more were considered old athletes.

Measures

A 22 item structured questionnaire was developed for this study. The first six items sought information on the nature of the athlete's sport, their demographic characteristics (age, sex, nationality), and knowledge of mouth guards as well as the duration of their use of mouth guards. The last 16 items focused on the perceived psychological (five items), sociological (six items), and physical (five items) stress factors using the 4 point, Likert type scale and a closed ended summated rating with "Strongly Agree" allocated 4 points, "Agree" 3 points, "Disagree" 2 points, and "Strongly Disagree" 1 point. The questionnaire contained questions such as "athletes use mouth guards to prevent the emotional trauma and problems of going through a long period of rehabilitation after the injury has occurred", and "the absence of social support (neglect) during the period of nursing the injury can be prevented if the athlete make use of a mouth guard".

The questionnaire was subjected to content validity with the assistance of experts in psychometrics to determine the validity of the instrument. This was done in order to ensure that the contents actually addressed all the variables used in the study. The reliability coefficient α for the stress factors were 0.79 for psychological stress, 0.66 for physical stress, and 0.74 for sociological stress. The means and the standard deviation (SD) of the variables for the 333 subjects are shown in table 2.

Table 2 Descriptive statistics and internal consistency coefficient for the stress variables

Variable (subscale)	$\bar{X}$	SD	α
Physical	17.24	2.646	0.66
Psychological	16.23	3.101	0.79
Sociological	19.55	3.304	0.74

Procedure

The questionnaires were administered to the athletes during the games by the coaches who served as research assistants. Instructions were given to the research assistants to guide participants on how best to complete the questionnaires.

Design and data analysis

The descriptive survey research design was adopted for the study because the researchers believed the design helps to interpret all the conditions existing in the study. This design was adequate since no intervention programme was used in the study.

The averages of the summated items on each of the stress variables, based on the weight allotted to the responses, were computed. The descriptive statistics of frequency count, percentage, mean, and SD were computed where appropriate. The inferential statistics of two way analysis of variance were used to test for significance in the perceived stress factors among the participants. Two way analysis of variance was specifically used to test for the interaction of sex and age of the athletes on the perceived stress factors. Scheffé post hoc analysis was used to identify the groups categorised by sport and variables where a significant difference was found.

RESULTS

Of the 500 questionnaires distributed, 386 were retrieved. Of these 53 were incomplete and were thus discarded. Consequently, 333 (67%) questionnaires were used for data analyses.

The results in table 2 show the mean and SD for the stress variables (subscales) and their internal consistency coefficient. The internal consistency of the subscales is relatively high and reliable.

The mean scores of the perception of athletes of the use of mouth guards to prevent the stresses of sports injury were examined between the male and female athletes on each of the stress factors as shown in fig 1A, B, and C.

The mean scores of the perception of the young and old athletes of the use of mouth guards to prevent the stresses of sports injuries was also examined and is shown in fig 2A, B, and C.

The main and interaction effects of sex and age were determined on the stress factors using the 2×2 analysis of variance procedure. Table 3 presents the sum of square, mean

Figure 1 Differences in male and female mean scores on (A) physical, (B) psychological, and (C) sociological stress.

Figure 2 Differences in the means of young and old athletes on (A) physical, (B) psychological, and (C) sociological stress.

square and F ratio of the effects of the demographic variables on the stress factors.

A matrix of correlation coefficient to show the strength of the relationship among the perceived stress factors was determined and is shown in table 4. The results reveal significant relationships among the stress factors. The strength of the relationship between psychological and physical stress was found to be higher than other relationships.

Table 5 shows the sum of squares, mean square, and F ratio of the effects of criterion independent variables of four groups of the athletes on the stress factors. The athletes were categorised into ball games, racket and stick games, combat sports, and individual sports based on the distribution in table 1. However the frequency (9) on the "No response" row and column in table 1 was not included in the categorisation.

The results shown in table 6 show that combat sports where the use of mouth guards is most important constitute 60.2%, which is the highest categorisation.

DISCUSSION

Sport is a well known cause of dental and oral injury. Sports related injuries account for 13–39% of all trauma cases in this area.¹⁰ The mouth guard is considered one of the most effective means to prevent injury, but knowledge of the prevention of dental and oral injuries among hobby and

Table 4 Correlation matrix for all perceived stress factors

	Physical	Psychological	Sociological
Physical	1.0000		
Psychological	0.4503**	1.0000	
Sociological	0.2717***	0.2187**	1.0000

** $p < 0.01$, two tailed significance.

professional athletes is not yet satisfactory, especially in Nigeria. Sports injuries can result in stressful conditions such as the pain of injury, the physical rigours of treatment, the emotional demands of treatment and rehabilitation, the psychological trauma at injury occurrence, separation from family, friends, and team mates, and the loss of important social roles. Athletes respond to injuries differently, sometimes underplaying its severity, not realising that injury can mean the instant end of a sporting career cultivated by several years of hard work. This study reveals that female athletes regard the use of mouth guards to prevent dental and oral injuries as more important than their male counterparts as shown in fig 1A, B, and C.

Table 3 Two way main and interaction effects of age and sex on athletes' perception of the use of mouth guards to prevent the stresses of sports injuries

Stress factor	Source	SS	df	MS	F ratio
Physical stress	Main effects	135.3	2	67.6	10.17**
	Sex	39.9	1	39.9	5.99**
	Age	95.4	1	95.4	14.34**
	Interaction	0.149	1	0.149	0.022
	Sex and age	0.149	1	0.149	0.022
	Explained	135.5	3	45.1	6.788**
	Residual	2189.2	329	6.6	
	Total	2324.7	332		
Sociological stress	Main effects	100.3	2	50.15	4.68**
	Sex	79.8	1	79.83	7.45**
	Age	90.4	1	20.46	1.91
	Interaction	0.516	1	0.516	0.048
	Sex and age	0.516	1	0.516	0.048
	Explained	100.8	3	33.6	3.136**
	Residual	3525.5	329	10.7	
	Total	3626.3	332		
Psychological stress	Main effects	38.3	2	19.15	2.03
	Sex	37.9	1	37.96	4.02**
	Age	0.357	1	0.357	0.038
	Interaction	53.29	1	53.29	5.65**
	Sex and age	53.29	1	53.29	5.65**
	Explained	91.6	3	30.5	3.23**
	Residual	31.02.6	329	9.43	
	Total	3194.2	332		

MS, mean square; SS, sum of square.

** F ratio significant.

Table 5 ANOVA table of athletes' perception of the use of mouth guards to prevent the stresses of sports injury among the four sport groups

Stress factor	Source	SS	df	MS	F ratio
Psychological stress	Main effect	480.07	3	160.025	19.47**
	Sport	480.07	3	160.025	
	Explained	480.07	3	160.025	
	Residual	2629.06	320	8.216	
	Total	3109.14	323		
Physical stress	Main effect	123.51	3	41.171	6.214**
	Sport	123.51	3	41.171	
	Explained	123.51	3	41.171	
	Residual	2120.22	320	6.626	
	Total	2243.73	323		
Sociological stress	Main effect	63.518	3	21.173	2.026
	Sport	63.518	3	21.173	
	Explained	63.518	3	21.173	
	Residual	3344.121	320	10.450	
	Total	3407.639	323		

MS, mean square; SS, sum of square.

**F ratio significant.

Table 6 Frequency and percentage distribution of the categorisation of sports into four independent variables

Sport	Frequency	Percentage
Ball games	59	18.2
Racket and stick games	67	20.7
Combat sports	195	60.2
Individual sports	3	0.9
Total	324	100

The study also reveals that old athletes perceived the use of mouth guards to prevent the physical stress experienced as a result of permanent physical change caused to the mouth as a result of injury, as more important than young athletes. Furthermore, the old athletes perceived the use of mouth guards to prevent the psychological and sociological stresses experienced as a result of dental and oral injuries as more important than young athletes as shown in fig 2A, B, and C. These findings may not be unconnected with the fact that experience, as a factor, may have been the basis of the result revealed. The athletes' long encounters with injuries coupled with their many years of use of mouth guards constitute an important aspect of the experience factor.

The demographic characteristics of age and gender were previously examined.^{11, 12} These variables have been shown to be implicated in the differential risk of sports injury. This study examined the main and interaction effects of age and sex on the perceived stresses associated with oral and dental injuries. It revealed significant main effects ($p < 0.05$) of sex

and age on the physical stress variable, but their interaction effects were not significant ($p > 0.05$). It further revealed a main significant effect ($p < 0.05$) of sex on the sociological stress variable, but no significant effect ($p > 0.05$) on the effect of age on the same variable. Their interaction effect is also not significant ($p > 0.05$). However, the main effect of sex on the psychological stress variable is significant ($p < 0.05$), and not significant ($p > 0.05$) for age, but there was a significant ($p < 0.05$) interaction effect as shown in table 3. This is also illustrated in fig 3A, B, and C. Gender and sports group had a significant effect on the reported use of mouth guards. Over 70% of the participants in the study considered that the use of a mouth guard helps to prevent oral trauma,¹¹ and the majority of the participants would consider wearing a mouth guard to prevent the stresses of injuries.

This study also used a matrix to examine the relationship among the stresses of injuries. The findings revealed greater strength in the relationship between the physical and psychological stresses of injury compared with that between sociological and psychological stresses, and sociological and physical stresses.

The athletes' perception of the use of a mouth guard to prevent the stresses of sports injuries, based on groups of sports, namely combat sports, racket and stick games, ball games, and individual sports, was also determined. The analysis of variance revealed a significant difference ($p < 0.05$) in the group categorisation on the psychological and physical stress variables, while there was no significant difference ($p > 0.05$) among the groups on the sociological stress variable as shown in table 5. Scheffé post hoc analysis was used to determine the groups where the significant

Figure 3 Interaction effects of sex and age on (A) physical, (B) psychological, and (C) sociological stress.

Table 7 Scheffé post hoc analysis on the categorisation of sports into four independent variables for psychological stress

Mean	Sport	Grp 4	Grp 2	Grp 1	Grp 3
11.66	Grp 4				
14.35	Grp 2				
15.52	Grp 1				
17.11	Grp 3	*	*	*	

Grp 1, ball games; Grp 2, racket and stick games; Grp 3, combat sports; Grp 4, individual sports.

*Indicates a significant difference.

Table 8 Scheffé post hoc test on categorisation of sports into four independent variables for physical stress

Mean	Sport	Grp 4	Grp 2	Grp 1	Grp 3
15.66	Grp 4				
16.17	Grp 2				
17.11	Grp 1				
17.69	Grp 3		*		

Grp 1, ball games; Grp 2, racket and stick games; Grp 3, combat sports; Grp 4, individual sports.

*Indicates a significant difference.

difference was found: differences existed between combat sports and individual sports, combat sports and racket and stick games, and combat sports and ball games on the psychological stress variables shown in table 7. Scheffé post hoc analysis also revealed a significance difference between the combat sports group and racket and stick games on the physical stress variable as shown in table 8. Mouth guards are mostly used by athletes who participate in combat sports, hence the reason for the significance. An amazing revelation of this study is the knowledge and usage of mouth guard by some athletes in sports where mouth guards are not required. However, athletes regularly change sports in Nigeria where the study was carried out, and hence the knowledge and usage; furthermore, athletes' past unpleasant experience with dento-facial injuries could have been the reason for the change in sport.

In conclusion, since the impact of injury on the athletes' psyche is potentially great, and since the stress of injury affects the cognitive function of athletes, athletes should be encouraged to use mouth guards during training and competition in order to prevent and reduce the incidence of oral and dental injuries so that they do not interfere with the athletes' normal functions.

What is already known on this topic

There is little research on the use of mouth guards in sports in the African continent.

What this study adds

Future research should examine the knowledge and attitude of athletes towards the use of mouth guards in other parts of the continent with a view to promoting their use among athletes and thus reducing the incidence of dento-facial injuries during participation in sports.

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