Relationship between Students Test Anxiety Levels and Academic Achievement in Secondary Schools

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Authors' contributions

This work was carried out in collaboration between both authors. Author OCB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author ECO wrote the protocol and managed the literature searches and the analyses of the study. Both authors read and approved the final manuscript.

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ABSTRACT

The study investigated the relationship between students' test anxiety levels and academic achievement in secondary schools. The study used correlational survey design using Test Anxiety Inventory (TAI) for data collection. It was a year-long study. The students' annual cumulative scores in English Language and Mathematics were used as measure of their academic achievement. Stratified random sampling was used to get a sample of 320 male and female students drawn from four secondary schools in Igbo-Eze South L.G.A. of Enugu state. Four research questions and three null hypotheses were formulated for the study. The data were analyzed using percentages, standard deviation, correlation and measure of central tendency (the mean) and t-test. On the bases of their scores on Test Anxiety Inventory (TAI), males were found to be more test anxious than females. The results showed that test anxiety increases with increase in class level. The result also revealed that the relationship between test anxiety and academic achievement was inverse with r = -77 That is, the relationship between test anxiety and academic achievement is such that as test anxiety increases, the academic achievement decreases. The implications and recommendations arising from the findings were highlighted.

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1. INTRODUCTION

In every school learning, children are tested at various times during the schooling period as teachers use tests to identify students with needed characteristics for promotion or placement in different grades. Test results are used by school teachers to judge their students' progress, by university or college admission's officer as indicator for selecting or rejecting applicants, by personnel experts as basis for hiring employees or promoting executives. Due to the importance of test results, testing could generate some anxiety in the learners. In this work, effort is made to identify the category of learners with higher test anxiety and how gender relates to test anxiety.

1.1 Test, Anxiety and Test Anxiety

Test The term "Test" is used loosely to include everything from brief school examination to complex inventories of personality traits [1]. Walter [1] defines test as a deliberate tendency to find out the level of interest, knowledge, skill and achievement on a given task. Some tests yield numerical grades whereas others result in a report of the examinee's impressions [2]. According to Cronbach (1980), intelligence cannot be visualized or measured directly but tests are constructed in such a manner that the evidence of an individual's intelligence, behaviour or performance as evoked by the test is compared to the intelligence, behaviour or performance of other individuals to whom the test has been administered.

Anxiety has been defined as feelings of apprehension and nervousness accompanied by the activation of the sympathetic nervous system which gives rise to physiological changes to the body such as increase of heart rate, blood pressure, perspiration, sweating and trembling, Crooks and Stein [3]. Anxiety is used to describe the subjective experience of unpleasant tension, uneasiness and distress that accompanies psychic trait or conflict, (Spielbeger, 1995). A lot of physical, social and psychological problems in school aggravate anxiety among students. All anxiety is a reaction to anticipating something stressful, especially the performance anxiety, [4]. A person can experience performance anxiety in a situation when he/she is to try out for the school play, sing a solo on stage, present a research proposal before a panel or attend a job interview. Each of these situations engenders condition of tension and panic.

Test anxiety is a type of performance anxiety, which is a feeling someone might have towards an impending testing situation in which performance is crucial to the person, [4]. Test anxiety is defined by Morris, Davis and Hutchings [5] as the evaluative apprehension aroused in the testee as a result of his/her concerns about the outcome of an impending test. The impending test increases the level of apprehension as the outcome of the evaluation increases its importance. For example, in Nigerian setting, academic achievement is looked upon as a basic condition for the improvement of one's socio-economic status. To secure a good job, to be recognized and respected depends on the level of one's academic achievement. Due to the high regards given to students with high academic achievements, fear of failure constantly put anxiety on students during examinations and testing. The negative thoughts about the outcome of the examination (pass or fail) and what the parents and friends will comment if they fail such tests and examinations sometimes results to fear, trembling during the examinations, illegible writing, heat on the parts of the body and all sorts of somatic experiences noticed during testing and examination periods.

Hancock, [6] considered test anxiety as a trait characterized by debilitating psychological, physical and behavioural responses exhibited by someone prior to sitting for an examination or in anticipation of an examination. Austin, Patridge, Bitner and Wadlingto (1995), were of the opinion that test anxiety is a sustainable feeling of tension and lack of self regulation of one's conduct as a result of an impending examination taking by the test anxious individuals. According to them, in some instances such un-usual fear and panic interfere negatively with the candidate's ability to face the examinations. They also point to the stress and impatience that characterized candidate's behaviours ahead of the proposed test date. Such behaviours have been known to hinder or prevent the ability of the affected individual to prepare for such test. Krohne and Laux [7], observed that one of the most difficult things for a teacher to address at the classroom level is enabling test anxious students overcome their test anxiety behaviours so as to emotionally and physically settle down and prepare for an impending examination.

However, Lewis (1980) was of the view that test anxiety, like some other anxieties, is normal because some anxiety can be helpful, prompting one to be better prepared for the demands of one's course. At low level of arousal, one may put little or no effort into preparing for examinations; at medium levels of arousal, one can work and prepare well and give his/her best performance; but too much arousal can disrupt and harm performance. This level of arousal is unpleasant and this is where test anxiety can become a problem, [8]. The nervousness students get before a test can be so strong that it interferes with their concentration or performance. Many studies like Spielberger and Sarason [9], Mckeachie [10] have found significant relationship between test anxiety and academic achievement. Theoretical reports about the adverse effect of test anxiety on academic achievement have been rife but empirical evidence for indigenous samples is necessary. The study was therefore, meant to close such gap and aimed at establishing the relationship between students' test anxiety levels and academic level of students in Nigerian secondary schools.

In Nigeria, some research work carried out by Ebigbo [11] and Kalu [12] as well as Denga [13] show that students both in the primary, secondary and higher institutions experience different levels of test anxiety. But the issue now is which category of students – (males/females and junior/senior) has higher test anxiety? Therefore, it is pertinent to identify and describe a number of important variables that could be related to students' test anxiety levels and their academic achievement such as: - Test anxiety in relation to gender. ie who is more tests anxious (males or females); and Test anxiety in relation to class level. ie the relationship between test anxiety and academic achievement in relation to the level of class attained.

1.2 Research Questions

Four research questions were formulated to guide this study, which are: -
- Research Question 1: What are the mean ratings of observable test anxiety behaviour among students?
- Research Question 2: What are the mean ratings of observable test anxiety behaviour between Male and female Students?
- Research Question 3: What are the mean ratings of observable test anxiety behavior between JSS II and SS II students?
- Research Question 4: To what extent do test anxious lower class (JSS II) students differ from test anxious higher class (SS II) students?

1.3 Hypotheses

Three hypotheses were tested in the study and these are: -

- ❖ **Hypothesis 1:** There is no significant relationship between students' test anxiety levels and students mean achievement scores in English Language and mathematics.
- ❖ **Hypothesis 2:** There is no significance difference in test anxiety levels between male and female students.
- ❖ **Hypothesis 3:** There is no significant difference in test anxiety levels between JSS II students and those in SS II.

2. MATERIALS AND METHODS

2.1 Research Methodology

This research is a correlational survey study design [14] to establish the relationship between students' test anxiety levels and academic level in secondary schools as well as the gender relationship with test anxiety. The study was carried out in Igbo-Eze South Local Government area of Enugu State which has ten secondary schools. The population for the study consisted of all the junior and senior students in secondary schools in Igbo-Eze South Local government Area of Enugu State. However, the focus of the research was on the target population of all the junior secondary class 2 (JSSII) and senior secondary class 2 (SSII) students of the secondary schools in Igbo-Eze South with about 1,472 JSII students and 1,324 SSII students, giving a total of 2,796. A sample of 320 students drawn from four sampled schools was used for the study. The sample was made up of eighty (80) students from each of the schools and it is consisted of 160 students from JSSII and 160 from SSII. Stratified random sampling technique (first among schools and later among classes or grades) was used in selecting the sample to take care of the gender of the students as drawn from different school types – boys, girls and mixed schools. The distribution of subjects by gender and class are as follows:

Table 1.

Distribution	Boys	Girls	Mixed	Total
No. of schools	1	1	2	4
Sample size	80	80	160	320
Class SSI	40	40	80	160
Class SSII	40	40	80	160

The Speilberger (1980) test anxiety inventory (TAI) and the annual cumulative scores on English language and Mathematics were used for the purpose of collecting data for this study. There was no trial testing of the inventory since it is a standardized instrument. Test Anxiety Inventory is used to measure anxiety proneness in tests, examinations and evaluative situations. The inventory (TAI) is a twenty-item inventory designed to assess three components WET of test anxiety, whereby: -

1. **W -** stands for Worry, which refers to excessive pre-occupation and concern about the outcome of a test, especially the consequences of failure.
2. **E** - stands for Emotionality, which refers to an individual's behavioural reactions and feelings aroused by test situations.
3. **T** - stands for Total anxiety score, which is the sum of W and E. It refers to the overall cognitive, affective and behavioural reactions to test or examination situations.

There were both positively worded and negatively-worded items in the scale, with positively worded items having direct scoring of 1, 2, 3, and 4, while the negatively worded items has reverse scoring of 4, 3, 2, 1. The TAI has been adopted in Nigeria.

The researchers administered the test anxiety inventory personally and they were collected back on the spot and scored. The score range of the TAI is as follows: - Almost Never = 1, Sometimes, =2, Often =3 and Almost Always=4. In order to provide decisions on each of the items in the scale, cut off points were established as follows: - Almost Never = Below 1.49; Sometimes = between 1.50 and 2.49; Often = between 2.50 and 3.49, and Almost Always = between 3.50 and 4.00. Students annual cumulative scores on English language and Mathematics were also collected from the class teachers of the students. The relationship between the mean examination scores and TAI scores were computed for analysis.

The research questions were analyzed using percentage and the measure of central tendency (the mean). The mean scores on test anxiety were compared to the mean scores on other variables like-gender and class level. Mean score of 2.5 and above is regarded as high test anxiety while mean score below 2.5 is regarded as low test anxiety. The annual cumulative mean score was also compared for each of the variable (gender, class level). For the hypothesis 1, Pearson's product-moment (r) was used to test the relationship while the t-test was used for testing hypotheses 2 and 3. The analysis was carried out under probability level of .05.

3. RESULTS AND DISCUSSION

3.1 Results

Research Question 1: What are the mean ratings of observable test anxiety behavior among students?

The mean scores and standard deviation of the students' test anxiety levels are as presented in the following Table 2.

The result in Table 2 show that majority of the students surveyed feel tensed when taking tests (Mean = 3.83). Another item that most of the students indicated "almost always" is item 9, which demonstrated that the students feel very nervous about test even when they have prepared well for a test. Other areas where the students indicated "almost always" include, thinking of the consequences of failure during tests; wish that examination did not bother them and thinking of grades interfering with their work on tests. However, most of the students indicated "almost never" when they were asked if they feel confident and relaxed while taking tests.

Research Question 2: What are the mean ratings of observable test anxiety behavior between male and female students?

The result according to gender is as presented Table 3.

Table 2. Mean and standard deviation scores of students ratings of observable test anxiety behaviours

S/N	Items	Mean	SD
1	I feel confident and relaxed while taking tests	1.11	1.23
2	While taking examination I have an uneasy, upset feeling.	3.12	1.48
3	Thinking about my grade in a subject interferes with my work on tests	3.53	1.30
4	I freeze up on important examinations.	2.10	1.41
5	During examinations I find myself thinking about whether I will ever get through school	2.87	2.03
6	That hard I work at taking a test, the more confused I get	1.59	1.71
7	Thoughts of doing poorly interfere with my concentration on tests	3.44	1.09
8	I feel very jittery when taking an important test	3.00	2.10
9	Even when I'm well prepared for a test, feel very nervous about it	3.81	1.19
10	I start feeling very uneasy just before getting a test paper back	3.13	1.43
11	During tests I feel very tense	3.83	1.71
12	I wish examinations did not bother me so much	3.55	2.11
13	During important tests I am so tense that my stomach gets upset	2.09	1.14
14	Seem to defeat myself while working on important test	2.92	2.05
15	I feel very panicky when I take an important test	2.03	2.11
16	I worry a great deal before taking an important examination	3.15	1.41
17	During tests I find myself thinking about he consequences of failing	3.66	1.74
18	I feel my heart beating very fast during important tests	3.42	1.86
19	After an examination is over I try to stop worrying about it, but I just can't	3.44	1.92
20	During examinations I get so nervous that I forget facts I really know	2.91	1.44

Table 3. Mean scores of students' ratings of observable test anxiety behaviours between male and female students

S/N	ITEMS	Male (Mean)	Female (Mean)
1	I feel confident and relaxed while taking tests	1.1	1.01
2	While taking examination I have an uneasy, upset feeling.	2.91	3.33
3	Thinking about my grade in a subject interferes with my work on tests	3.67	3.38
4	I freeze up on important examinations.	1.79	2.41
5	During examinations I find myself thinking about whether I will ever get through school	2.86	2.88
6	That hard I work at taking a test, the more confused I get	1.39	1.79
7	Thoughts of doing poorly interfere with my concentration on tests	3.44	3.07
8	I feel very jittery when taking an important test	2.93	3.07
9	Even when I'm well prepared for a test, feel very nervous about it	3.91	3.71
10	I start feeling very uneasy just before getting a test paper back	3.14	3.12
11	During tests I feel very tense	3.15	3.92
12	I wish examinations did not bother me so much	3.50	3.60
13	During important tests I am so tense that my stomach gets upset	2.09	2.09
14	Seem to defeat myself while working on important test	2.96	2.88
15	I feel very panicky when I take an important test	2.05	2.02
16	I worry a great deal before taking an important examination	3.61	2.69
17	During tests I find myself thinking about the consequences of failing	3.87	3.45
18	I feel my heart beating very fast during important tests	3.43	3.41
19	After an examination is over I try to stop worrying about it, but I just can't	3.40	3.48
20	During examinations I get so nervous that I forget facts I really know	3.90	2.92

Table 4. Mean scores of students' ratings of observable test anxiety behaviours of JSS II and SSII students

S/N	ITEMS	JS II	SS II
1	I feel confident and relaxed while taking tests	1.10	1.12
2	While taking examination I have an uneasy, upset feeling.	2.41	3.63
3	Thinking about my grade in a subject interferes with my work on tests	3.13	3.93
4	I freeze up on important examinations.	2.10	2.10
5	During examinations I find myself thinking about whether I will ever get through school	2.67	2.97
6	That hard I work at taking a test, the more confused I get	1.19	1.99
7	Thoughts of doing poorly interfere with my concentration on tests	3.48	3.40
8	I feel very jittery when taking an important test	3.00	3.00
9	Even when I'm well prepared for a test, feel very nervous about it	3.11	3.91
10	I start feeling very uneasy just before getting a test paper back	3.03	3.23
11	During tests I feel very tense	3.72	3.94
12	I wish examinations did not bother me so much	3.65	3.45
13	During important tests I am so tense that my stomach gets upset	2.02	2.16
14	Seem to defeat myself while working on important test	2.61	3.23
15	I feel very panicky when I take an important test	2.03	2.03
16	I worry a gr44eat deal before taking an important examination	2.84	3.46
17	During tests I find myself thinking about he consequences of failing	3.35	3.97
18	I feel my heart beating very fast during important tests	3.41	3.43
19	After an examination is over I try to stop worrying about it, but I just can't	3.03	3.85
20	During examinations I get so nervous that I forget facts I really know	2.90	2.92

The results as presented in Table 3 shows that males and females differ in their reactions to test anxiety. For the males, they obtained the highest mean score on observable test anxiety behaviour on item 9 (Mean = 3.91), showing that majority of them indicated "almost always" when asked if they feel very nervous about test even when they are prepared for the test. For the females the highest mean score on observable test anxiety was recorded on item 11 (Mean = 3.92), indicating that most of the female participants feel very tensed during tests.

Research Question 3: What are the mean ratings of observable test anxiety behavior between JSS II and SS II Students?

The result according to the academic level of the students is as presented Table 4.

The data on Table 4 above shows that most of the JSS II students feel very tensed when taking tests (Mean = 3.72). With regards to the SS II students, the item that attracted the highest mean score was item 3. This indicates that majority of the SSII students agree that thinking about grades in a subject interferes with their work on test most often.

Research Question 4: To what extent do test anxious lower class (JSS II) students differ from test anxious higher class (SS II) students?

Table 5. Mean and standard deviation scores on academic achievement of JSS II and SS II students

	Mean X	Standard deviation (SD)	N
JSS II	69.51	13.49	160
SS II	63.84	15.75	160

In answering research Question 4, the researchers compared the mean scores on academic achievement of JS II and SS II students. The result as indicated in Table 5 above show that JSS II students had higher mean score on academic achievement (Mean = 69.51), than the SS II students (Mean = 63.84).

3.2 Hypotheses

Hypothesis 1: There is no significant relationship between students' test anxiety levels and students mean achievement scores in English Language and Mathematics.

The results as presented in Table 6 show that there is a strong negative relationship; between

test anxiety and academic achievement of students (r = -.77). This shows that the higher the students' test anxiety the lower their scores on academic achievement.

Table 6. Pearson correlation showing the relationship between test anxiety and academic achievement

	Anxiety level	Academic achievement
Anxiety level	-	-.77
Academic achievement	-.77	-

Table 7. A table for the t-test on students' text anxiety levels

	Mean X	Standard Deviation (SD)	N	t	df	Sig:
Male	42.75	9.68	160	3.16	318	.05
Female	39.29	9.89	160			

Hypothesis 2: There is no significant difference in test anxiety between male and female students.

The result of the study as presented in the above Table 7 show that males have higher mean scores on test anxiety (Mean = 42.75) than females (Mean =39.29). When these were subjected to t-test analysis, the result showed that males differ significantly from females in report of test anxiety with a t-score of 3.16, which is higher than the table value of 1.96 at 318 degrees of freedom with p<.05 level of confidence.

Hypothesis 3: There is no significant difference in test anxiety between students in JSS II and those in SS II.

The data as presented in Table 8 shows that SS II students have higher mean score on the test anxiety (Mean =43.96) than students in JSS II (Mean =38.08). When they were subjected to t-test analysis, the result also showed statistically significant differences in test anxiety between JSS II and SS II students with a t score of 5.53, which is higher than the table value of 1.96 at 318 degrees of freedom at, P < .05 level of confidence.

3.3 Findings

Based on the analysis of the data, the following findings were made:

➢ Majority of the students surveyed feel tensed when taking test.
➢ Males obtained higher mean score on test anxiety than females.
➢ Most of the JSS II students feel much tensed when taking tests while majority of the SS II students agreed that thinking about grades in a subject interferes with their work on test.
➢ Test anxiety mean score increased with increase in class level.
➢ There was negative relationship between test anxiety and academic achievement of students.

3.4 Discussion of Findings

The data in Table 2 show that majority of the students' surveyed feel tensed when taking tests with test anxiety mean score of 3.83 and standard deviation of 1.71. This means that almost all the students experienced test anxiety but the levels of anxiety differ among them. Here, there are more test-anxious students than low test-anxious students. This finding is expected since there is overemphasis in school achievement in our educational sector, which may be anxiety provoking for majority of the students.

The data in Table 3 show that males and females differ in their reaction to test anxiety. Males obtained the highest test anxiety mean score of 3.91 on item 9, which shows that the most occurring observable test anxiety behaviour of male students was feeling of nervousness about tests even when they are well prepared about the test. With regards to females, the most prominent of the observable test anxiety behavior was feeling of tension during test (Mean = 3.92).

The data in Table 4 show that JSS II students feel tensed when taking tests with the test anxiety means score of 3.72. With regards to SS II students, the most observable test anxiety behavior was thinking about grades which interfere with their work on test most often and this attracted the highest mean score of 3.97. This means that JSS II students differ from SS II students in observable test anxiety behaviors.

According to the data in Table 5, JSS II students observed test anxiety mean score of 69.51 on academic achievement and standard deviation score of 13.49 while SS II students had test anxiety mean score of 63.84 on academic achievement and standard deviation score of

15.75. This agrees with Cherkes-julkowski, Groebel and Kuffer [15] report that there is a general increase of test anxiety level for students of upper academic class (SS II) than students of

Table 8. Mean and standard deviation scores on test anxiety between JSS II and SS II Students

	Mean X	Standard Deviation (SD)	N	t	df	Sig:
JSS II	38.08	8.44	160	5.53	318	.05
SS II	43.96	10.45	160			

lower academic class (JSS II). The higher the anxiety mean score, the lower the academic achievement. Therefore, of the three levels of test anxiety, SS II students scored highest in their test anxiety mean score indicating that they are more test anxious than JSS II students.

The null hypothesis that there is no significant relationship between students test anxiety levels and student mean achievement scores in English language and mathematics was rejected as the obtained correlation coefficeint of r = -77 indicates a strong negative relationship between test anxiety and academic achievement scores in student's English language and mathematics. The findings support what Wigfield [16] reported, that anxiety and academic achievement are significantly related. The present finding is also in line with Sullivan [17] and Sarason [18] who found that test anxiety had a negative relationship on academic achievement for high test-anxious over low test-anxious students. However, in his study, the negative relationship was observed to be higher for females than for males. This means that the academic performance of female students was found to be more affected by test anxiety than their male counterparts.

The second null hypothesis which states that there is no significant difference in test anxiety between male and female students was also rejected. This was based on the fact that, males have been found in this study to be more test anxious with a test anxiety mean score of 42.75 and standard deviation score 9.68 than the females with mean score of 39.29 and standard deviation score of 9.89. In other words, in this study, test anxiety was found to be more prevalent among male students than male students [19, 20]. The null hypothesis that there is no significant difference in test anxiety between JSS II students and those in SS II classes was equally rejected, since it was found that SS II students have highest test anxiety mean score of 43.96 while those in JSS II obtained 38. 08. The study proved clearly that those students in SS II are more test anxious than those in JSS II class. This finding supports

Cherkes-Julkowshi, Groebel and Kuffer [15] who reported that there is a general increase of test anxiety level for students of upper academic class (SS II) than students of lower academic class (JSS II). This is however expected since the value for academic achievement increases as student move towards their graduation from schools. In Nigeria secondary school system, students are expected to write their Senior School certificate Examinations and performance in the examinations to a large extent shapes their future achievements in life including school and career progressions. The mere knowledge of the impact of success or failure in such examinations on their life could provoke a lot of anxiety on the students.

4. CONCLUSION

The study shows that students experience test anxiety which at low level of arousal, one may put little or no effort in preparing for examination; at moderate level of arousal, one can work and prepare well and give his or her best performance but too much arousal can disrupt and harm performance. Therefore, facilitating anxiety is required for ones maximum academic achievement to the best of one's ability while that which militates against individual's performance is debilitating.

This study found that those students with low level of test anxiety performed significantly better than those with high level of the anxiety academically. This means that high level test anxiety interferes with student's performance more than the low level anxiety. However, it was found that the low test anxious students should not be seen as more intelligent than the high level test anxious students. The fact is that the high test anxious students are usually under a serious and adverse effect of anxiety which interferes with their normal functioning of cognitive process. The present research has shown that students in high class level (SSII) experience more test anxious than those in the junior class (JSS II). Also, boys are more test anxious than girls.

5. RECOMMENDATIONS

Based on the findings, the researchers wish to make the following recommendations: -

1. All helping professionals working in the secondary school system such as counselling psychologists, clinical psychologists and social personnel should use appropriate instruments to identify students suffering from test anxiety and help them out of the problem.
2. Students should be exposed to seminar or workshop to enlighten them on the effects of anxiety on their academic achievement because as Benjamin (1981) hypothesized, the academic achievement of high test anxious students with poor study skills might be affected directly by their lack of knowledge and indirectly by the cognitive distraction created by thinking about this poor knowledge in the test situation itself.
3. The result that test anxiety increases with increase in class level suggests that there is the need to extend the treatment of test anxiety to junior class students to prevent the students from growing up with it to senior classes for it may be more beneficial to prevent anxiety than to cure it.
4. Equally, curriculum planners who may consider entrenching in the curriculum other methods of testing that would be less anxiety provoking than the prevalent methods of testing observed in schools at present.

Further researchers should aim at identifying other characteristics of the two types of test anxious students including motivational, cognitive and demographic aspects such as exploring other situational effects like school climate and assessment ideology along with a larger variety of test formats or assessment techniques. In short, the researchers advocate a school reform through a change from a "Testing culture' to an "assessment culture".

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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