Influence of Stress, Sleep Disorders and Anxiety on Senior Secondary School Science Students’ Mental Health and Achievement in Katsina State, Nigeria

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ABSTRACT
This research study investigated the influence of stress, sleep disorders and anxiety on mental health and achievement of senior secondary school science students. The study employed the descriptive survey and ex post facto research designs. The population comprised 3085 public senior secondary school science students in Katsina State, Nigeria. Through purposive random sampling, a sample size of 250 SS II science students was drawn for the study. Two research questions guided the study and two null hypotheses were tested at 0.05 level of significance. Two instruments were used for the study. The first was Pittsburgh Sleep Quality Index (PSQI) and Science Achievement Test (SAT) were used for the study. An adopted version of Pittsburgh Sleep Quality Index (PSQI) was a standard questionnaire used in measuring sleep quality and disorder. The instrument addresses questions regarding sleep quality regarding duration and fragmentation in addition to susceptibility to health problems. The reliability of PSQI was determined using Cronbach-alpha reliability, \( r = 0.80 \) was obtained. The second instrument named Science Achievement Test (SAT), SAT was a 20 itemed instrument with options A – D that tested the students’ knowledge and comprehension in Physics, Chemistry and Biology. The items were allotted 1mark each, culminating to the total score of 20marks. The test was validated by experts and was trial-tested. The reliability of SAT was determined using K-R21 formula and the reliability coefficient obtained was 0.81. Descriptive statistics of frequencies and percentages were used to answer research question one while mean and standard deviation were used to answer the research question two. Chi square was used to test hypothesis one and Analysis of Variance (ANOVA) was used to test the hypothesis two at 0.05 level of significance. Findings from the study revealed that significant differences did exist between stress, sleep disorders, anxiety on mental health and achievement of science students. Based on the findings of the study recommendations were made that: The provision of educational materials in the areas of stress-coping, sleep hygiene and their influence on health and learning outcomes should be included in Science and other related secondary school curriculum.

Keywords: Achievement, Anxiety, Mental Health, Science, Sleep Disorders, Stress.

INTRODUCTION
Science is a core subject taught in schools all over the world, and science educators believe that any nation that hopes to develop must not neglect the teaching and learning of science in its schools (Fafunwa, 2004). Science education is a veritable instrument for social change which brings about socio-economic development and empowerment worldwide. The application of scientific knowledge to real life problems is the most powerful instrument for enabling society to face global challenges and innovations in
education. Eze (2010) maintained that science education is at the centre of empowerment of students toward self-reliance and industrial skills that are needed for survival especially in this era of global economic crisis. In order to achieve the goals of science education, students need facilitating environments devoid of stress and anxiety.

Stress is a complex interaction between individuals and their environment that can impact their general well-being (Saleh, Camart & Romo, 2017). Senior secondary school students experience predictable, stressful life events during their school years which often lead to sleep disorders and further endanger their mental health wellbeing. Most students may not realize that sleep disorder is also a stressor in addition to their daily life stress, and altogether could have negative impacts on their physical and mental health (Saleh, Camart & Romo, 2017; Lee, Wuert, Rogers & Chen, 2013). Stress is thus, detrimental to good health and sleep habits of students where increased stress levels and psychological problems are associated with poor quality sleep.

Sleep has many important effects on the human body such as memory retention, where it plays a role in stabilizing perceived information and facilitating generalized knowledge (Ahrberg, Dresler, Niedermaier, Steiger & Genzel, 2012). People who get enough and quality sleep have more energy, better cognitive function, healthier immune systems, improved memory and perform effectively throughout the day because they are in a good mood (Carskadon, 2011). They are better able to acquire and connect new information with current knowledge. This explains why sleep is key to good health, as body cells turn over more quickly when there is proper sleep, thus making sleep the best way to look and feel refreshed. During sleep, the brain also clears unnecessary information and the space between brain cells expands thus, allowing it to flush out waste that accumulates while one is awake (Iunes, Moura, Carvalho, Nogueira, Silva, Souza, Miranda & Chaves (2017). When good sleep is not properly practiced, it results in negative health.

Ineffective sleep alters a person’s body sleep schedule (Milojevich & Lukowski, 2016). It should be noted that the quality of sleep is as important as its quantity. The choices made during the day, such as what is consumed, the activities/stress levels and sleep environment, all combine to impact on the quality of sleep gained at night (Huamaní & de Castro, 2014). Therefore, people who get enough quality sleep have more energy, better cognitive function, healthier immune systems, and improved memory performance throughout the day.

Sleep quality is defined as the degree to which restful sleep is maintained during the night, where a healthy normal individual feels refreshed upon waking up throughout the day, (Ahrberg, Dresler, Niedermaier, Steiger & Genzel, 2012). All students experience stress, but the tremendous amount of knowledge they are required to obtain in a short time period induces stress leading eventually to poor sleep quality and late nocturnal sleep associated with daytime sleepiness. This prompts poor sleep quality and ultimately, influences academic performance (Modayfer, Aamer, Abdellellah, Adel & Olayan, 2016). Physical and psychological health is also compromised with poor sleep quality and the percentage of these disorders increases with the severity of the condition.

Lee and Hsu (2012) discovered that sleep disorders are more prevalent among American females compared to males, and these sleep problems negatively affect their daytime functioning, physical and psychological well-being. Lee, Wuert and Rogers (2013) also found that women are more vulnerable to the effects of sleep disorders than men because of their physio-psycho-social differences.

Sleep disorder is defined as sleep deprivation resulting from inadequate total sleep time or sleep disruption resulting from fragmented sleep during the night, which can lead to adverse mental health. Sleep disorders can cause daytime sleepiness, which can lead to poor performance in school. Sleep disorders also increase the risk of developing depression (Ramsawh, Stein, Belik, Jacobi & Sareen, 2009). Barclay, Eley, Maughan, Rowe and Gregory (2011) reported that sleep problems are associated with poorer mental health outcomes from childhood to adulthood. Understanding relations between sleep and mental health in senior secondary school students can be important due to the potential to intervene and improve their mental health outcomes before they become chronic.

Anxiety is a condition of emotional state characterized by feelings of tension that vary in intensity over time and personal disposition to react to situations perceived as threatening (Iunes, Moura, Carvalho &
According to Ramsawh, Stein, Belik and Jacobi (2009) anxiety usually occurs when an anticipated event is expected to make demands for which a person is unprepared and therefore lacks the necessary coping shock absorbers to withstand it. They also assert that when anxiety is experienced regularly, it leads to anxiety disorder, which is one of the most common consequences of sleep disorder. The focus of this study therefore, was to investigate the influence of stress, sleep disorders and anxiety on senior secondary school science students’ mental health and achievement. Specifically, it was designed to answer the following research questions:

1. What are the stress, sleep disorders and anxiety level on mental health of male and female senior secondary school science students?
2. What are the stress, sleep disorders and anxiety level on achievement of male and female senior secondary school science students?

**Research Hypotheses**

The following hypotheses were tested at 0.05 level of significance.

- **Ho₁**: There is no significant influence of stress, sleep disorders and anxiety level on mental health of male and female senior secondary school science students.
- **Ho₂**: There is no significant influence of stress, sleep disorders and anxiety level on achievement of male and female senior secondary school science students.

**METHODOLOGY**

The study employed the descriptive survey and ex post facto research design. The population comprised three thousand and eighty-five co-educational senior secondary school science students in Katsina State, Nigeria. The sample size of 250 SS II science students was drawn through purposive random sampling among the schools in the State. Two research questions guided the study and two null hypotheses were tested at 0.05 level of significance. Two instruments were used for the study. The first was Pittsburgh Sleep Quality Index (PSQI) and Science Achievement Test (SAT) were used for the study. An adopted version of Pittsburgh Sleep Quality Index (PSQI) was a standard questionnaire used in measuring sleep quality and disorder. The instrument addresses questions regarding sleep quality regarding duration and fragmentation in addition to susceptibility to health problems. The reliability of PSQI was determined using Cronbach-alpha reliability, (r = 0.80) was obtained. The second instrument named Science Achievement Test (SAT), SAT was a 20 itemed instrument with options A – D that tested the students’ knowledge and comprehension in Physics, Chemistry and Biology. The items were allotted 1mark each, culminating to the total score of 20marks. The test was validated by experts and was trial-tested. The reliability of SAT was determined using K-R₂₁ formula and the reliability coefficient obtained was 0.81. Descriptive statistics of frequencies and percentages were used to answer research question one while mean and standard deviation were used to answer the research question two. Chi square was used to test hypothesis one and Analysis of Variance (ANOVA) was used to test the hypothesis two at 0.05 level of significance.

**RESULTS**

**Research Question One**

*What are the stress, sleep disorders and anxiety level on mental health of male and female senior secondary school science students?*

The stress, sleep disorders and anxiety level on mental health of senior secondary school science students are presented in Table 1.
Table 1. Frequency and Percentage Distributions of Stress, Sleep Disorders and Anxiety Level on Mental Health of Male and Female Science Students

<table>
<thead>
<tr>
<th>Gender</th>
<th>Stress, Sleep disorders and Anxiety level on Mental Health</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Male</td>
<td>75</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>(59.5%)</td>
<td>(40.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>66</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>(53.2%)</td>
<td>(46.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>141</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>(56.4%)</td>
<td>(43.6%)</td>
</tr>
</tbody>
</table>

Table 1 reveals that out of 250 science student sampled (126 males and 124 females), 75 (59.5%) male Science students experienced high stress, sleep disorders and anxiety level on their mental health while 51 (40.5%) experienced low stress, sleep disorders and anxiety level on their mental health. It also shows that, 66 (53.2%) female Science students experienced high stress, sleep disorders and anxiety level on their mental health while 58 (46.8%) experienced low stress, sleep disorders and anxiety level on their mental health.

Research Question Two
What are the stress, sleep disorders and anxiety level on achievement of male and female senior secondary school Science students?

The influence of stress, sleep disorders and anxiety level on achievement of male and female senior secondary school Science students are shown in Table 2.

Table 2. Influence of Stress, Sleep Disorders and Anxiety on Senior Secondary School Students’ Achievement Based on SAT

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of Students</th>
<th>Mean Scores</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>126</td>
<td>91.69</td>
<td>17.38</td>
</tr>
<tr>
<td>Female</td>
<td>124</td>
<td>75.87</td>
<td>20.52</td>
</tr>
</tbody>
</table>

Table 2 shows that the mean scores of male students 91.69 and that of their counterparts is 75.87. The Standard deviation shows that the scores of both male and female Science students are not far from the mean.

H0: There is no significant influence of stress, sleep disorders and anxiety level on mental health of male and female senior secondary school Science students.

Table 3. Chi Square Analysis of Stress, Sleep Disorders and Anxiety Level on Mental Health of Male and Female Science Students

<table>
<thead>
<tr>
<th>Gender</th>
<th>Stress, Sleep disorders and Anxiety level on Mental Health</th>
<th>Total</th>
<th>Df</th>
<th>Cal $\chi^2$</th>
<th>Crit. $\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Counts Expected High</td>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>75</td>
<td>51</td>
<td>126</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(59.5%)</td>
<td>(40.5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Counts Expected</td>
<td>66</td>
<td>58</td>
<td>124</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(53.2%)</td>
<td>(46.8%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>141</td>
<td>109</td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(56.4%)</td>
<td>(43.6%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3 shows that the calculated $\chi^2$ value was 1.34 while the critical $\chi^2$ value was 3.84 with 1 degree of freedom at 0.05 level of significance. Since the calculated $\chi^2$ value was less than the critical $\chi^2$ value, the hypothesis was therefore not rejected. This implies that there was no significant influence of stress, sleep disorders and anxiety level on mental health of male and female senior secondary school Science students. 

$H_0_2$: There is no significant influence of stress, sleep disorders and anxiety level on achievement of male and female senior secondary school Science students.

Table 4. ANOVA Analysis on Students’ Stress, Sleep Disorders and Anxiety on Male and Female Science Students’ Achievement Using SAT

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>Df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>542.326</td>
<td>328.224</td>
<td>2</td>
<td>29.215</td>
<td>0.000</td>
</tr>
<tr>
<td>Within groups</td>
<td>5524.350</td>
<td>9.215</td>
<td>243</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6066.676</td>
<td></td>
<td>250</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at $p<0.05$

Table 4 shows significant influence of stress, sleep disorders and anxiety level on male and female science students’ achievement. The hypothesis is therefore rejected, indicating that there is a significant influence of stress, sleep disorders and anxiety level on achievement of male and female senior secondary school Science students in favour of the male students.

**DISCUSSION**

The findings of this study revealed that there was no significant influence of stress, sleep disorders and anxiety level on mental health and achievement of male and female senior secondary school science students. These findings agree with those of Sing and Wong (2011) and Nadorff, Nazem and Fiske (2011) who found that stress, and depression significantly influence students’ mental health and achievement. Similarly, stress and poor sleep are significant predictors of depressive symptoms and physical symptoms which can affect students’ achievement. These are consistent with the findings of Ramsawh, Stein, Belik and Jacobi (2009) who found that students who complain of poor sleep have also metabolic differences. This is in consonance with the findings of Huamani and Castro (2014); Orzech, Salafrsky and Hamilton (2011); Carskadon (2011) who found that stress, sleep disorders and anxiety level influence students’ performance. This finding is also consistent with earlier studies of Castillo and Schwartz (2012) who discovered that higher levels of stress and anxiety play predominant roles in reducing quality of sleep which invariably affects performance of students. The possible reason for high stress, sleep disorders and anxiety level on achievement of female students more than the male students could be as a result of preference given to male students. Female students engage in domestic activities more than their male counterparts.

**CONCLUSION**

The findings of this study shows the existence and influence of stress, sleep disorders and anxiety among senior secondary school science students’ mental health and achievement in Katsina State.

**RECOMMENDATIONS**

i. Proper counselling service should be provided in schools for students to improve their stress, sleep disorders, anxiety and mental health status.

ii. The provision of educational materials in the areas of stress-coping, sleep hygiene and their influence on health and learning outcomes should be included in Science and other related secondary school curriculum.

**REFERENCES**


