

Comparative Assessment of Stress Indicators and Cognitive Impairment Rates of Teachers

Eniola Morufat AZEEZ

Department of Biology

Emmanuel Alayande College of Education, Oyo

eniaseez1@gmail.com

+2347057843225

Abstract

Teachers are of paramount importance in the society as they spearhead the transmission of the society's knowledge, values and skills to the next generation. However, like every other professional in a cognitively demanding job, they are often likely to experience stress and could sometimes be subjected to cognitive impairments and neurodegenerative diseases. This study investigated the relationship between stress levels experience by teachers and their level of cognition. One hundred and fifty teachers were randomly selected for this study. Two research instruments were administered, the perceived stress scale and the self-administered gerocognitive examination to measure the stress experienced by teachers and to measure cognition respectively. Results showed that the majority of the teachers were generally subjected to moderate levels of stress and the level of stress experienced by teachers is not influenced by their gender or their age group. Correlative analysis between the perceived stress scale and the self-administered gerocognitive tests showed that there is a negligible relationship between the stress score of the teacher and their cognition levels. Efforts should be made to reduce the stress teachers are exposed to in order to protect them from cognitive impairment.

Keywords: Stress, Cognition, Neurodegenerative disease

Introduction

Teachers play the essential roles of educating and mentoring the next generation. Regardless of the important roles they play in the society, teachers like every other member of the society are susceptible to neurodegenerative diseases like the rest of the population. Arezes, Barbosa and Miguel (2010) noted that teaching is a cognitively demanding job. As such a high level of cognition is therefore required in teachers. Cognition refers to processes such as perceiving, reasoning, conceiving and recognizing through which knowledge is consciously and unconsciously acquired (Britannica, 2022). Any deficiency in the cognitive activities of an individual is generally referred to as cognitive impairment and it is usually a common occurrence as aging takes place. Several factors have been identified to influence cognition and cognitive impairments in humans. They include stress, aging, nutrition, oxidative stress etc.

Measurement of stress levels in individual has been carried out using the perceived stress scale. The perceived stress scale is a classic stress assessment instrument which was developed in 1983. This test was designed to measure how different situation that affects the emotions and stress level of the respondents. The perceived stress scale is one of the more precise measures of personal stress within an individual. It comprises of ten questions which were to be answered with never (0 points), almost never (1 point), sometimes (2 points), fairly often (3 points) and very often (4 points). The total achievable score on the stress scale is 40 points, scores between 0 and 13 are considered to indicate low stress, while scores ranging from 14 to 26 is considered moderate stress, and any score higher than 26 indicates high level of stress.

Measuring cognitive impairment for research purposes is usually carried out using the Self-Administered Gerocognitive Examination. The Self-Administered Gerocognitive Examination (SAGE) was an instrument developed to screen for mild Cognitive Impairment and early dementia. It consists of two sections. The first section elicits information on demography of the respondents, insight, family history, motor symptom, stroke symptom, personality changes etc. All items in this section are unscored as such they do not contribute to the SAGE score of the respondents. The second section of the test tests respondents on memory, orientation, verbal fluency, calculation, problem solving, etc. The total attainable score on the SAGE test is 22 while the minimum score is zero. A score of 17 is considered the normal on this test, while any score lower might indicate the present of mild cognitive impairment.

Purpose of the Study

This study therefore, set out to investigate the relationship between stress and cognitive impairment in teacher during their service years. The level of stress is determined by the teachers' score on the perceived stress scale while cognitive impairment is measured using the Self-Administered Gerocognitive Examination score. The relationship

between the stress level and cognitive impairment is determined by a correlation between the perceived stress score and the score on the Self-Administered Gerocognitive Examination score.

Research Hypotheses

To establish this link, the following null hypotheses were tested:

- i. There is no statistically significant difference in the stress experienced by teacher of different genders
- ii. There is no statistically significant difference in the stress experienced by teacher of different age groups
- iii. There is no statistically significant relationship between the perceived stress score of an individual and their Self-Administered Gerocognitive Examination score.

Methodology

The research design adopted for this study is the descriptive survey design. Data was collected from active teachers in school and correlative analysis was carried out between the scores of teachers on the perceived stress and their score on the self-administered Gerocognitive examination. The population of this study comprises of the teachers in Oyo state. However, due to the size of the population and their spread across 33 local government areas, teachers in Akinyele local government area were purposive selected. One hundred and fifty (150) respondents were then randomly selected from six schools in Akinyele local government area and the instrument was administered to them. The Instrument used was a questionnaire constructed by combining the standard Perceived Stress Scale and the standard Self-Administered Gerocognitive test. Descriptive statistics was used to categorise respondents into groups. The perceived stress score and the Self-Administered Gerocognitive Examination test were then subjected to bivariate analysis by determining the coefficient of correlation. Analysis of variance was employed in testing the hypotheses.

Results

Demography of Respondents

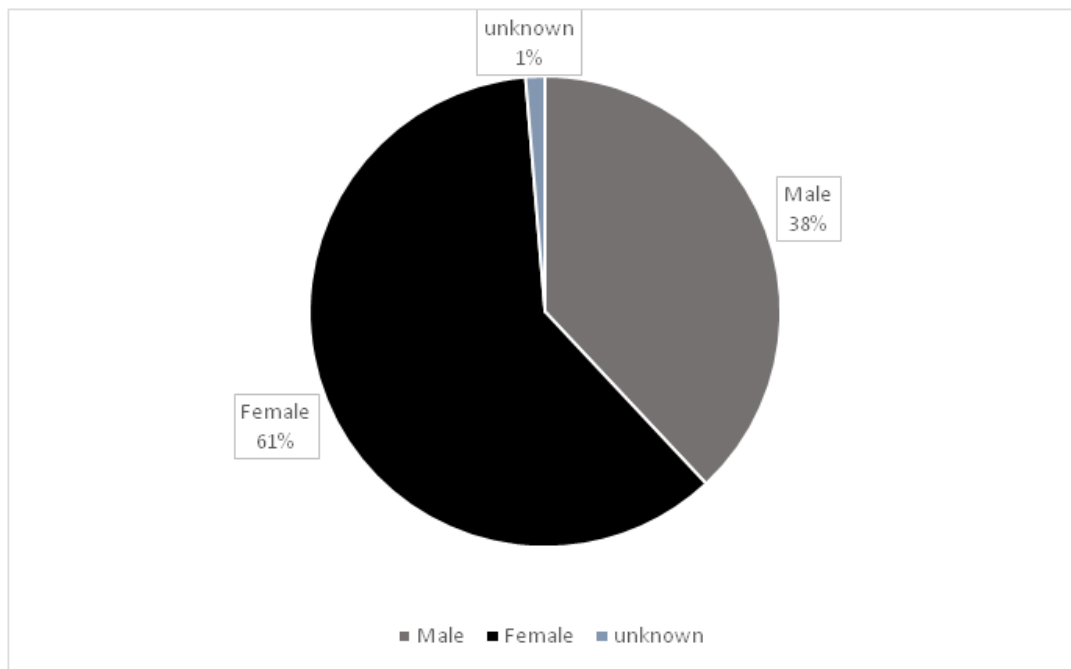


Figure1 : Pie Chart showing the distribution of male and female respondents

From the figure1, the total number of respondents in this study is 150 respondents. Of the 150 respondents sampled, 61% (n = 91) of them are female while 38% (n = 57) of the respondents are male. Two respondents representing 1% of the sampled population did not indicate their gender as such they were dropped from further analysis. The higher female population in the number of respondents is due to the imbalance between the genders in the sampled schools. Generally, there is a bias that teaching is more predominantly a female job and this has been confirmed by the fact that there are more female teachers in the teaching service than there are male teachers, as such this study adjusted for this by sampling more female teachers than male teachers. There exists a disparity in the distribution of male and female teachers across the age groups. For the age group between 25 and 30 years of age across the schools, female teachers in the dataset (n = 46) are about twice the number of male teachers (n = 21). The age group 31 – 35 accounts for 28.37% of all the respondents (n = 42). There exists a marginal difference between the number of male and

female teachers in this age group with the male teachers (n = 22) being only two members higher than the female teachers (n = 20). The age group 36 and above accounts for 26.35% (n = 39) of the respondent population. The distribution of the male and female teachers in this age group is shows that female teachers (n = 25) is almost double of that of the male teachers (n = 14).

Research hypothesis 1: There is no statistically significant difference in the stress experienced by teacher of different genders

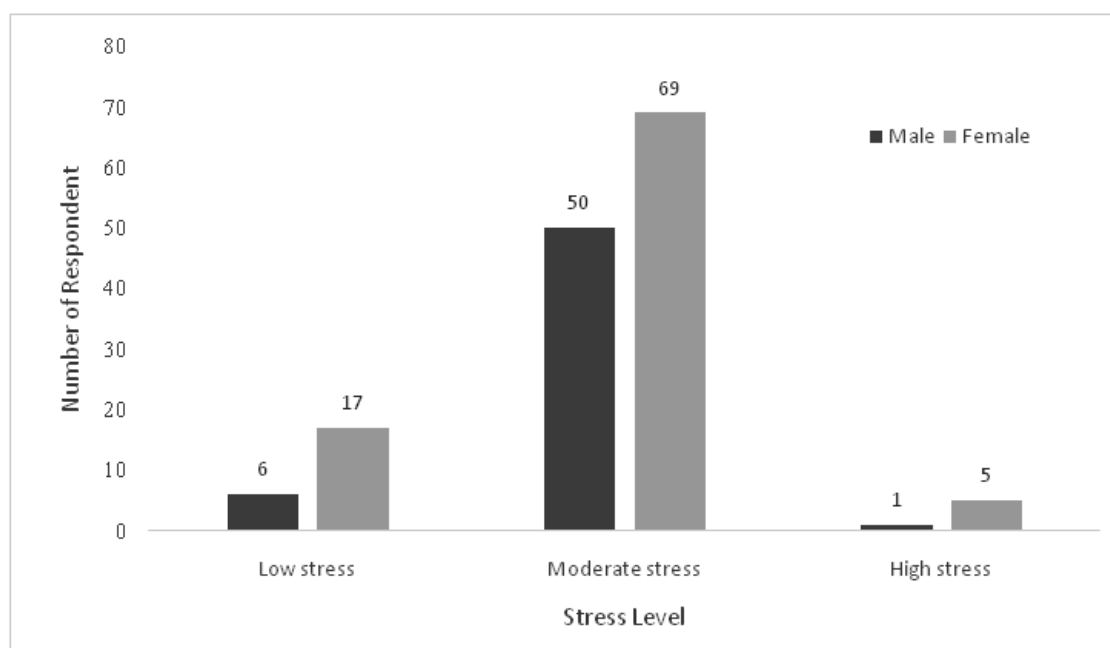


Figure 2: Stress Level of respondents according to the Perceived Stress Scale

The above figure shows the results of respondents on the Perceived Stress Scale based on gender. Out of the 91 female respondents, 18.68% (n=17) have PSS scores of between 0 and 13 therefore, their stress level is categorised as low, 69 female respondents representing 75.83% of the female respondents have PSS score between 14 and 25 indicating moderate level of stress in the respondents while the remaining 5.49% (n = 5) of the respondents fall within the high stress category as their PSS score is higher than 25. It is of interest to note that no single respondent has PSS score of above 25. Furthermore, 10.52% (n = 6) of all male respondents have a perceived stress score of lower than 14, as such they are categorised as having low perceived stress score. One respondent (1.7% of all male respondents) had PSS score higher than 25 which indicates the stress level is high while the remaining 87.78% (n = 50) have PSS scores ranging from 14 to 25 and are classified as moderately stressed.

Table 1: Result of z-test for Male and Female Teachers' Stress Level

	Male	Female
Mean	17.31579	18.01111
Known Variance	20.6628	14.29135
Observations	57	90
Hypothesized Mean Difference	0	
Z	-0.96304	
P(Z<=z) one-tail	0.167765	
z Critical one-tail	1.644854	
P(Z<=z) two-tail	0.335529	
z Critical two-tail	1.959964	

* $\alpha = 0.05$

Table 1 presents the result of a z-test carried out to determine whether there is a statistically significant difference between the stress level of male and female teachers in the selected schools. From the table, the z-score for the data is -0.9630 which is lower than the critical z-score of 1.6448 as such it can be concluded that there is no statistically significant difference between the level of stresses experienced between the male and the female teachers in the selected schools. It can thus be stated that the level of stress experienced by each teacher is not dependent on their gender as both male and female teachers are subjected to similar levels of stress on the job.

Research hypothesis 2: There is no statistically significant difference in the stress experienced by teacher of different age groups

Table 1: Result of One-Way Analysis of Variance on the Age Groups of the Respondents
SUMMARY

Groups	Count	Sum	Average	Variance
25 - 30	67	1142	17.04478	20.95251
31 - 35	42	772	18.38095	10.48548
31 - 35	39	706	18.10256	21.62078

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit	Decision
Between Groups	54.55874	2	27.27937	1.5015	0.226238	3.058486	NS*
Within Groups	2634.36	145	18.168				
Total	2688.919	147					

*At $\alpha = 0.05$

Table 2 shows the result of a one-way analysis of variance on the different age groups of the respondents. This analysis was carried out to determine whether the level of stress teachers experienced is dependent on their age. From the table, it can be seen that the F-stat is 1.5015 which is lower than the critical F of 3.058486. Therefore, there is no statistically significant differences between the levels of stress experienced by the respondents across the age group. This implies that although, teachers belong to different age groups, they experience similar levels of stress on the job.

Descriptive Analysis of Results from the Self-Administered Gerocognitive Examination

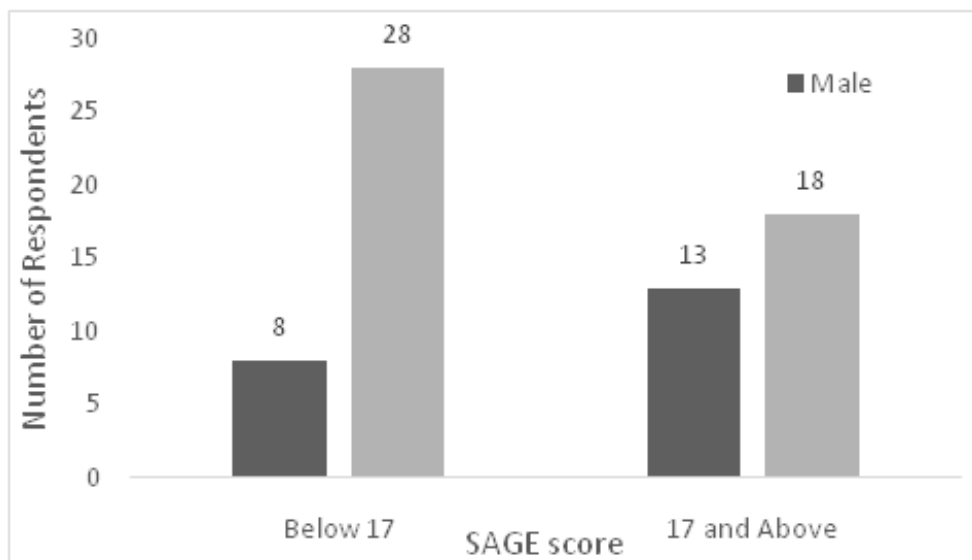


Figure 3: SAGE Scores of teachers between Ages 25 and 30

Figure 3 shows the result of teachers between the ages of 25 and 30 years on the Self-Administered Gerocognitive Examination. Out of the 46 female teachers who took this test, 28 (60.86%) female teachers scored lower than the normal score of 17. Out of the 21 male teachers in this age group, 8 (38.1%) score below the normal score of 17. The percentage of teachers in this age group scoring less than the acceptable normal score of 17 is alarming. Of particular concern is the 60.86% of female teacher which is almost double the 38.1% of male teacher who are considered to have failed the SAGE test. This is of particular note because even though the SAGE test was designed to identify mild cognitive impairment and early dementia, this age group is expected to have the lowest number of participants with the lowest scores since, cognitive impairment and dementia are more often found in the elderly and not young ones. However, when compared with the other age groups, this age group has the second highest proportion of participants (53.7%) to have failed the SAGE test.

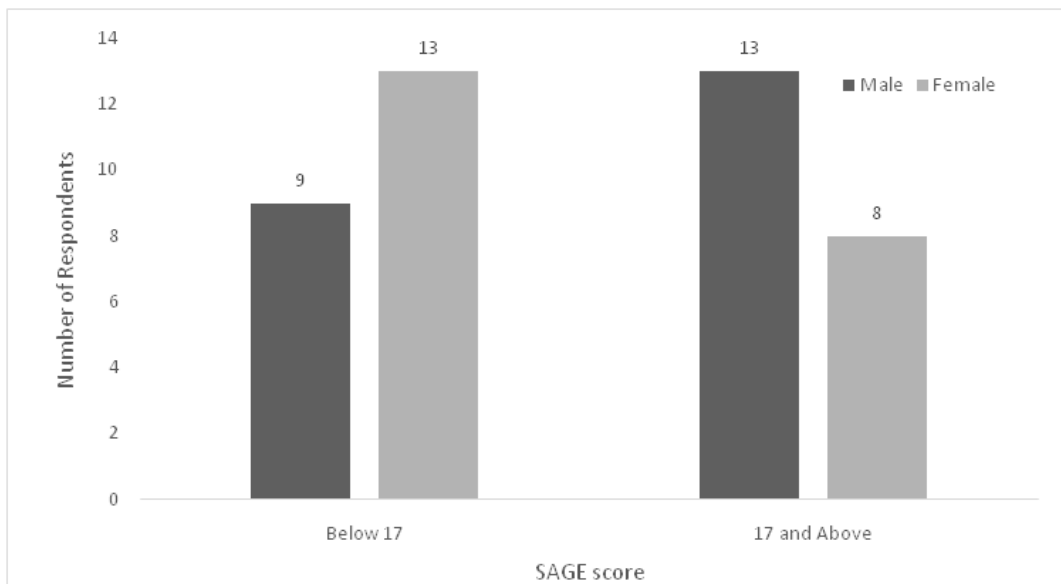


Figure 4: SAGE Scores of teachers between Ages 31 and 35

Figure 4 shows the results of respondents on the Self-Administered Gerocognitive Examination. There are a total of 43 respondents in this age group of which 22 (51.16%) are male and 21 (48.83%) are female. Out of the 22 male respondents, 9 (42.85%) scored below 17 while out of the 21 female teachers, 13 (61.90%) scored below 17. This is similar to the trend observed in the 25 – 30 age group where the female scored less than their male counterpart on the Self-Administered Gerocognitive test administered. However, 51% of all respondents in this age group scored less than the required 17. This is usually high considering the group of the respondents. But across the age groups, the lowest proportion of participants below 17 was recorded here.

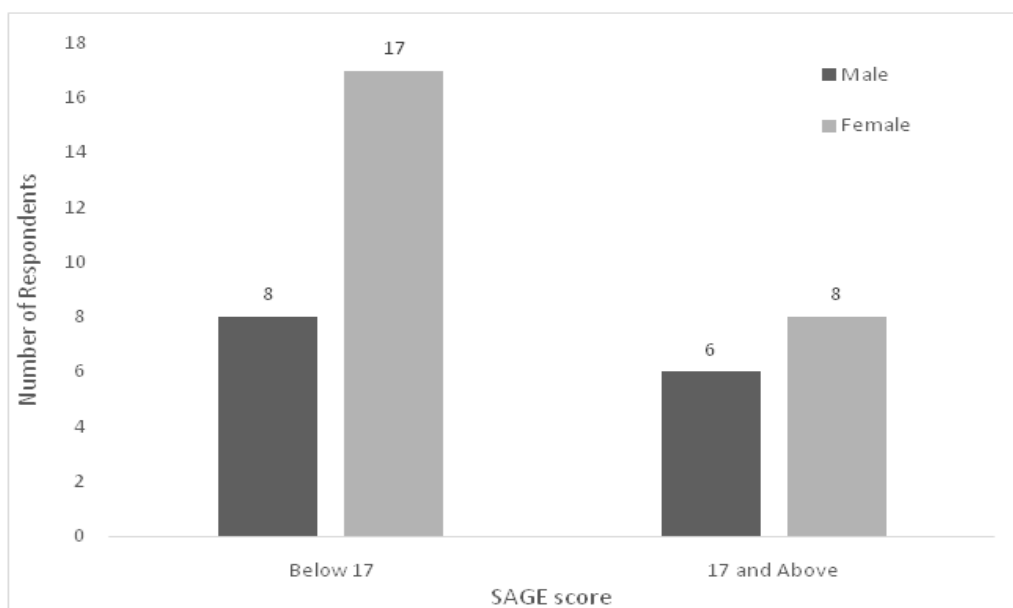


Figure 5: Self-Administered Gerocognitive Examination result of teachers above 35

In the 36 and above age group, the total number of respondents was 39, 25 of whom were female while the remaining 14 were male. Out of 14 male respondents, 8 (57.14%) scored lower than 17 which was considered the normal score for the Self-Administered Gerocognitive Examination. While out of 25 female respondents in this category, 17 (68%) scored lower than 17 as shown in Figure 5. This age group has the highest number of respondents with scores lower than 17 with 64.1% of all respondents in this age group scoring below 17. The higher proportion of respondents with lower scores is probably explain by the large age group accommodated here and the fact that with increasing age, there is a normal decline in cognitive activities. However, the proportion is quite high.

Research hypothesis 3: There is no statistically significant relationship between the perceived stress score of an individual and their Self-Administered Gerocognitive Examination score.

Correlative Analysis of Perceived Stress Score and SAGE scores
Male

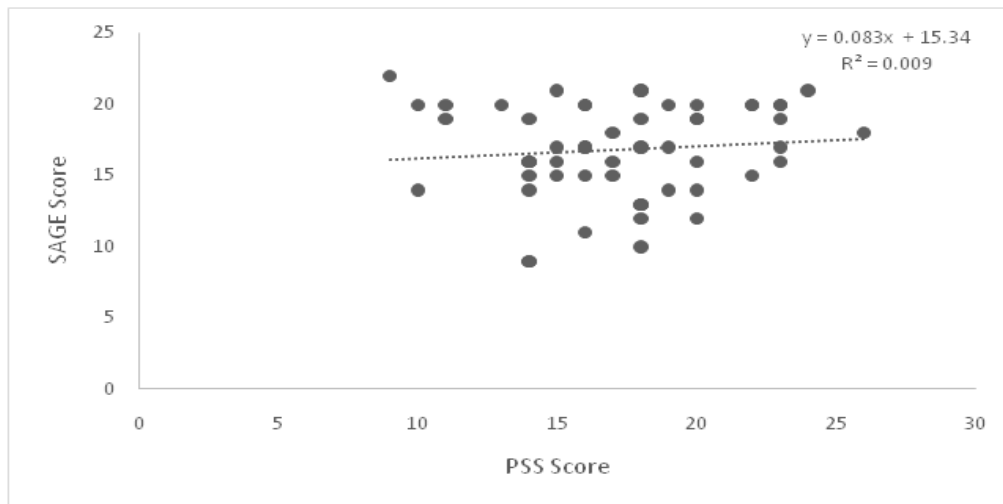


Figure 6: Scatterplot of the PSS score and SAGE score of male teachers

For the overall male population of this study, figure 6 shows the scatterplot of the PSS score against the SAGE score. Overall coefficient of Correlation is 0.0975. Overall, there is a weak correlation between the PSS scores and the SAGE scores. For every one-unit increase in the perceived stress score of the male teachers, there is a 0.0975 unit increase in their SAGE score.

Female

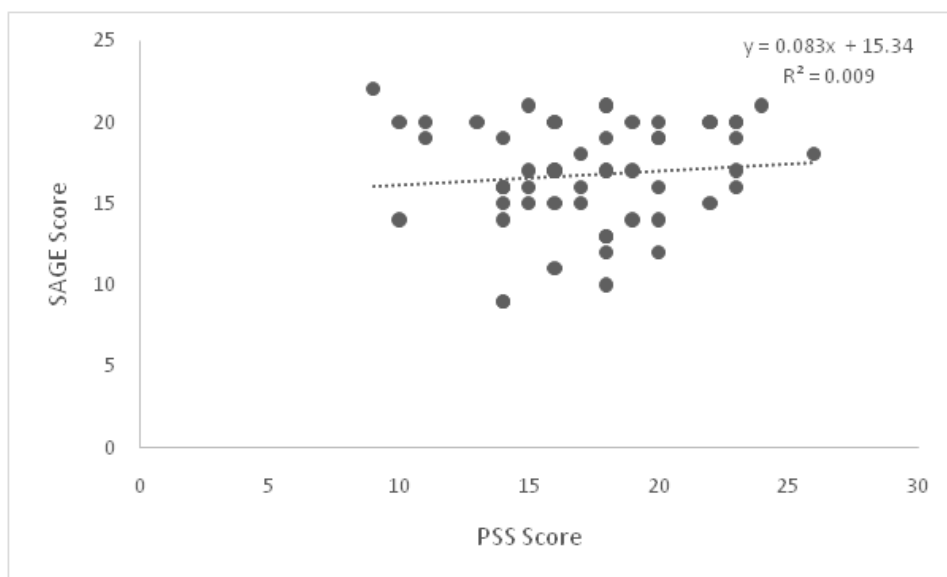


Figure 7: Scatterplot of the PSS score and SAGE score of female teachers

The scatter plot of the relationship between the female teachers PSS score and the SAGE score is shown in figure 7. The coefficient of Correlation between the two scores is 0.0782. Although this is a very weak correlation, there seems to be no significant relationship between the PSS score and the SAGE scores of these teachers. As such the PSS score is not a good predictor of the SAGE scores of the respondents.

Discussion of findings

From the result of the perceived stress scale, it can be stated that majority of the sampled respondents fall into the categories of either being moderately stressed or being subjected to low levels of stress on their job. This is in contrast to the work of Nwimo and Onwunaka (2015) who reported that teachers in secondary schools in Ebonyi state are subjected to high levels of stress. Their study further compartmentalised stress into physical, mental, social and emotional stress and concluded that teachers are subjected to statistically significant emotional and social stresses while the levels of physical and mental stresses is statistically insignificant. Results also showed that the level of stress experienced by each teacher was not dependent on their gender as both male and female teachers were subjected to same levels of stress. This opposed the findings of Nwimo and Onwunaka (2015) who posited that male teachers were significantly more stressed than female teachers. Teles *et al.* (2020) in their research into the perceived stress levels of tertiary education teachers concluded that there is a differential between the stress level experienced by female teachers and male teachers with the female undergoing more stress than the male teachers. This is contrary to the result of perceived stress scale carried out in this research work.

Results of the one-way analysis of variance shows that there was no statistically significant differences between the levels of stress experienced by the respondents across the age group. This implies that although, teachers belong to different age groups, they experienced similar levels of stress on the job. This is of note because across the differing age groups, different levels of work experience abound. As such, regardless of the work experience, the teachers tend to have similar levels of stress. This is in agreement to the results from the research of Teles *et al.* (2020) who found out that stress levels in teachers with teaching experience of lesser than ten years and those in teachers with more experience (30 years and above) were quite similar and the least levels of stress reported among teachers.

The Self-Administered Gerocognitive Examination gauges the level of cognition of an individual and rates this on a scale of 1 to 22. Individuals with scores of seventeen and above are likely to have normal cognition while individuals with scores of 15 and 16 are likely to have mild cognitive impairment (MCI) and any score of 14 and below probably indicates dementia in the individual (Scharre, *et al.*, 2014). From the analysis of the questionnaire, 83 respondents representing 56.08% of all respondents scored below the 17 baseline. This could indicate that they are likely to have either mild cognitive impairment or dementia. However, a full investigation of this is beyond the scope of this research work. Of the 83 respondents that scored lower than seventeen, 36 respondents (24.32%) have scores of 15 and 16 while the remaining 31.76% scored fourteen and below. A cursory look at the instrument filled by the teachers who scored less than seventeen revealed that they struggled with questions testing memory and problem-solving skills. As such many of the teachers left this section of the instrument unfilled, with incorrect or incomplete answers. Overall, the correlation between the perceived stress of an individual and the score on the self-administered gerocognitive examination was 0.06938. This indicates that the perceived stress of an individual is not a very good predictor of their score on the self-administered gerocognitive examination.

Conclusion

Although teaching is generally regarded as a demanding job, results from this study shows that teachers are generally subjected to moderate levels of stress. The results of the two tests show little correlation as such it can be concluded that the perceived stress scale is a poor predictor of the score on the gerocognitive test. In essence, this study found no correlation between stress and cognitive impairment among teachers. However, a surprisingly large number of teachers underperformed on the self-administered gerocognitive tests.

Recommendations

Based on the results from this study, the following are recommended:

- i. Teachers should endeavor to take measures to protect their mental health especially as they grow and are more susceptible to neurodegenerative diseases.

- ii. Further research effort should be directed at identifying the link between the stress experienced by teachers and cognitive impairment among teachers as they age.

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