BIOLOGY TEACHERS' ACADEMIC SELF-CONCEPT AND ACADEMIC STRESS AS PREDICTORS OF ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL BIOLOGY STUDENTS IN ENUGU EDUCATION ZONE

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Abstract

This study focused on teachers' academic self-concept and academic stress as predictors of academic achievement of Biology students' in Enugu Education Zone. Six (6) null hypotheses were postulated for the study. The study adopted ex-post-facto research design. The population of study comprised 74 Biology teachers in 33 public secondary schools in Enugu Education Zone with SS 2 biology students' population of 4,737. The sample consisted of all the Biology teachers' in the Zone and a sample of 10% of the students' were sampled from the Biology teachers' classroom.The instrument used for data collection were three (3) – Marsh teachers' academic self-concept scale, Balamurugau and Kumaran academic stress scale and Students' scores from their promotion examination 2022/2023 academic year were used to measure their academic achievement in Biology. The instruments were validated by three experts and the internal consistency reliability was determined though Cronbach Alpha method. The teachers' self-concept scale yielded a reliability index of 0.92 while teachers' academic stress scale yielded an index of 0.88 coefficients. The data collected were analysed using Simple and multiple regression analysis with Statistical Package for Social Sciences (SPSS) version 22. The findings of the study showed that: Teacher academic self-concept significantly and positively predicted students' academic achievement in Biology in Enugu Education Zone; likewise, teachers' academic stress significantly and negatively predicted students' academic achievement in Biology in Enugu Education Zone. Based on these findings it was recommended amongst others that Biology teachers should arrange learning activities, in such a way that it will help students to be self-directed in their learning in order to have significantly positive achievement in Biology.

Keywords and Phrases: *Biology, Academic Stress, Self-Concept, Academic Achievement, Gender*

Introduction

Biology is one of the core science subjects that are offered by students at senior secondary school level of education. One of the prerequisite subjects for science-based courses at the post-secondary level of education in Nigeria is Biology. Originating from

the Greek terms "bios" (life) and "logos" (study), the word biology was born. Thus, the study of life or the study of plants and animals can be termed Biology (Michael, 2015). Biology is a distinct branch of science that examines living things and their basic functions. Biology is a branch of science that examines living things and is designed to provide students with the necessary scientific knowledge and abilities (Michael, 2015). One of the scientific subjects that is well-liked by students studying pure science and has a significant role in the secondary school curriculum is Biology. The goal of the secondary biology curriculum is to equip students with sufficient laboratory and field skills, relevant and useful biology knowledge, and the capacity to use scientific literacy and knowledge to make successful life adjustments (FME, 2018). Learning Biology will equip students with relevant laboratory and field skills, significant and applicable biological knowledge, scientific knowledge useful in health, agriculture, and other personal and community daily life matters, as well as the advancement of functional scientific attitudes, according to the National Policy on Education (NPE, 2013). Biology supports the study of nature. It is strongly related to other science courses including Agricultural science, Chemistry, Geography, Mathematics, and Physics.

Biology as a subject of significant importance plays vital role in any given society and man's daily life. Considering its various branches and broad applications in different fields, its significance in a nation's economic development cannot be over-emphasized. Knowledge of Biology helps us to understand the living world and the ways its many species function evolve and interact. It is a subject matter of great importance and concern to all. Biology helps to develop attitudes and science process skills such as observing, inferring, classifying, hypothesizing, questioning, measuring, interpreting, communicating and predicting (Aisha, 2021). Biology deals with all the physiochemical aspects of life. It encompasses diverse fields including zoology, botany, ecology, genetics, morphology, anatomy, physiology, histology, microbiology, biochemistry, evolution and the more advanced cell biology, molecular biology, among others (Joshi et al 2023). Biology has many applications in the natural environment. Studying biology however allows health care workers to understand the living systems of the body and to apply the knowledge in direct ways to recover and maintain the physical health of both animal and human patients. Biology plays an important role in the understanding of complex forms of life involving humans, animals and plants. Biology helps individuals to understand the interaction between humanity and the world. It also develops interests in the lives of living organisms in an effort to preserve them. Studying biology is the foundation of all characteristics of life on earth. Apart from creating solutions to the numerous challenges of many living organisms, it paves way for inventions and discoveries that improve the quality of life. Biology can also be appreciated by the advances in the improvement of food supply and elimination of hereditary diseases.

Biology being a science-oriented course has developed advancement as it concerns the field of forensic science, genetic engineering and machines (Florence, 2022). Oyovwi (2022) noted that biological knowledge and explosion has expanded all over the

world via the internet, hence there are advances recorded in fields such as Biochemistry, Physiology, Ecology, Genetics and Molecular Biology that have made the subject a central focus in most human activities including problems like food scarcity, pollution, population, radiation, disease, health, hygiene, family life, management and conservation of natural resources as well as biotechnology and ethics. Educating people in biology has been widely acknowledged as a way of promoting economic development, eliminating poverty, creating employment and introducing social welfare (Oyovwi, 2022). Oyovwi (2022) further asserted that Biology is a popular science subject taught at the senior secondary level and it attracts the greatest patronage of both Science and Arts oriented students. Despite the relevance of Biology and the fact that it is one of the core subjects recommended by the Federal Republic of Nigeria (FRN, 2014) in the National Policy on Education, there has been a problem of poor achievement among secondary school students (Efobi &Okigbo, 2022). Bamigbade et al, (2021) also posited that although many African countries are making effort at improving Biology at all levels of the educational system, it appears that the returns in terms of students learning achievement are little.

Despite the high place of Biology towards the advancement of national development, students' achievement in Biology remains so abysmal. Achievement in academics is the process of evaluating educational outputs and outputs that are expressed in terms of learning. It is the modification in behaviors, knowledge, skills and attitudes of individuals as a result of their encounter within the schools' system. Academic achievement according to Zheng and Mustappha (2022) is the successful completion of certain educational levels that students can achieve after series of trainings usually within a school, college or university settings. Academic achievement is typically measured by internal or external assessments and refers to the extent to which a student, instructor, or institution has precisely met or fulfilled their long- or short-term educational goals. Academic achievement, according to Suleiman (2023), is the performance results that show how far a person has come toward particular objectives of activities inside instructional environments, like school. Academic achievement can be understood as the knowledge and skills acquired in school subjects, with test scores determining its level. Oyovwi (2022) further defined academic achievement as the outcome of learning that expresses the degree to which instructional objectives have been attained. Hemwati and Ritu (2014) similarly described academic achievement as the level of proficiency obtained in particular literary or academic topic areas. Academic achievement was also described by Steinmayr et al. (2020) as the progress made toward acquiring educational skills and knowledge across a range of disciplines. According to Steinmayr et al. (2020), achievement in academic settings refers to the accomplishment outcomes that show how well a student has used particular ideas that served as the main focus of activities in a learning environment. Hemwati and Ritu (2014) further asserted that the most widely utilized indicators of a student's degree of academic achievement in a given topic are their academic or educational age and accomplishment outcomes. Continuous

assessments and class exams are typically used to measure academic accomplishment, which is primarily used to check the extent of students' knowledge, skills, and understanding in relevant areas (Efobi & Okigbo, 2022). Academic achievement, according to Onah (2023), is a student's current standing in terms of their academic performance, as demonstrated by their grades, their performance on instructional achievement tests, and cumulative indicators like degrees and certificates. Numerous variables have been shown to impact Biology students' academic performance, and these variables significantly impact biology students' achievement levels. Studies conducted over time have shown that students who enroll in Biology do not always fare well academically (Akande et al 2018; Duyilemi & Bolajoko, 2014; Joda, 2019). It is so daunting that candidates academic achievement in Biology for the past seven (7) years; 2016 to 2022 are 45.4%, 48.2%, 56.17%, 57.42%, 61.68%, 55.57% and 55.10% respectively (WAEC Chief Examiners report, 2016 to 2022). The students' achievement according to the chief examiners report fell below average in 2016 and 2017. From 2018 to 2022, student performance improved above average, reaching a peak percentage of 61.68% in 2020. Even if there has been a noticeable improvement, Nigeria, a nation in dire need of scientific understanding in fields like Biology, is not entirely encouraged by this development. Agaba (2013) blamed Biology educator's lack of dedication to teaching for the pupils' appalling results. The researcher argued that Biology teachers' self-concept and stress contributed to students' failure. The purpose of this study was to investigate how teachers' academic self-concept and stress affect secondary school Biology students' academic progress.

The term self-concept generally means the way an individual perceives oneself. Self-concept according to Muhammad and Mariam, (2018), is a person's understanding and attitude toward oneself. It is a person's sense of self and the way in which he manifests his abilities and potentials. According to Wehrle and Fasbender (2018), a person's self-concept is the culmination of their valued self-judgments, ideologies and sophisticated ordered system of beliefs. Self-concept is very important and plays a big role in determining a person's personality. When individuals regard their own academic achievements like success, or have navigated difficult subject areas is known as academic self-concept.

Academic self-concept generally is referred to the way individuals view their academic accomplishments. Academic Self-concept according to Onah (2023) is the presumption and evaluation of a person's academic abilities. Onah (2023) further asserted that academic self-concept is the intellectual abilities and personalities of an individual. In general, the term "self-concept" refers to the intricate, coordinated, and self-driven framework of beliefs, perspectives, and judgments that people accept as realistically true in relation to their own existence and the evaluation of their own academic aptitude. The definition of a teacher's self-concept is simply their perception of themselves as educators. According to Onah (2023), an educator's academic self-concept is their self-assertion of their academic skills and their capacity for successful teaching

and learning. In the same vein, Ajmal and Rafique (2018) also defined teachers' academic self-concept as how a teacher feels about him/herself as a teacher and how he/she plays his/her role in the school settings through conceptualized pupils' awareness and perception of their academic capacities. According to Jelena and Jelena (2018), teachers' perceptions of themselves are shaped by a number of factors, such as their social self-concept, their effectiveness, and their confidence. As stated by Kumari and Chamundeswari (2013), academic self-concept devises a great influence on the students' academic performance and it helps in determining the level of proficiency among them. Kumari and Chamundeswari (2013) equally noted that the way students conduct themselves at school depends on their self-awareness and their approach regarding their talents and latent potentials. Individuals get better grades in school through their teachers' self-concept when positively impacted. Glotova and Wilhelm (2013) also observed that positive self-concept in teachers encourages student's self-regulation, motivation and a high level of self- esteem. Self-concept in the article is anchored on M. V. Covington's theory of Self-worth which demonstrates how individuals value and present themselves for learning. Self-concept is essential in any teaching–learning process, but, it could be adversely affected by academic stress (ÓscarGavín-Chocano et al. 2021). The World Health Organization (WHO, 25/08/2023) defines stress as a condition of mental strain or uncertainty brought on by a difficult circumstance. According to Osagie (2018), stress is the body's typical reaction to an overwhelming amount of mental, emotional, or physical strain that is too much for a person to handle. The American Psychological Association (APA, 04/10/2023) asserted that stress is a normal reaction to everyday pressure but can become unhealthy when it affects one from functioning effectively. They further stated that stress affects both psychological and physical health invariably reducing the quality of life. Stress occurs when individuals encounter situations that they regard as overwhelming and cannot contend with (Bataineh, 2013). Furthermore, Kahn et al (2013) posited that stress can happen to anyone and it can adversely affect an individual's physical, emotional health and even academic success if it is not properly managed. Stress has become an important topic of discussion among various researchers (Nwakile et al, 2020). Researchers in various fields of education and social sciences have carried out several researches on stress and its dire consequences and established that extensive research on stress is needed in their respective fields (Cîrligeanu, 2017; Osagie, 2018; Alson 2019). Stress can impede academic growth. When the body's response to academic related demand exceeds the adaptive capabilities of that individual is known as academic stress. García-Martínezet al (2021), defined academic stress as the state of distress perceived by individuals as a result of their interrelation with all the external factors that affect purely their academics. Academic stress is referred to as intellectual demands that are known to exceed teachers' or students' internal or external coping resources (Walburg, 2014). Academic stress according to Internet Public Library (IPL, 16/08/2023) is mental worry or frustration that is associated with academic failure. Stress related to academics results from rising demands on the teaching and learning process. Teacher stress is the

term used to describe the tension that instructors experience when carrying out their tasks. The concept of stress in this regard is anchored in Richard Lazarus's transactional theory of stress and coping. It shows how the teacher could manage stress through presentation of appealing materials. However, by practicing stress management skills and using appropriate coping mechanisms, teachers may maintain their mental health and lead better lives (Samson-Akpan et al., 2017). Everyone is affected by stress, regardless of gender.

Gender is the psychological, physical, social and cultural characteristics that distinguish males and females (Onah, 2022). The World Health Organization (WHO) defines gender as the socially constructed traits associated with males, women, girls, and boys. This encompasses interactions between people as well as the standards, actions, and roles that come with being a woman, man, boy, or girl. Differently impacted by the various types of stress in academic contexts, male and female teachers eventually experience differing effects on their performance (Wandera, 2021). This research therefore was undertaken on the basis of gender-related differences on teachers' educational self-concept and stress as predictors of academic achievement in secondary school Biology students.

Statement of the Problem

There is an increasing public worry of students' poor academic achievement in Biology in our secondary school system. This disheartening development extends to subordinate schools in Enugu Education Zone of Enugu State. This was made evident in the literature of the zone and has resulted to inability of students to cope effectively with higher educational task when offered admission into the tertiary institutions. Many factors may be responsible for this situation. However teachers' self-concept and academic stress as predictors of students' achievement has remained a silent issue in Enugu Education Zone and these factors are presumed to account for poor academic levels in Biology. Self-concept is the intellectual abilities and personalities of an individual that contributes to how well he does task or not.

Under normal circumstances, teachers should teach students and feel free with the job without much stress. Their major concern should be to prepare and deliver their lessons, go back to their homes and have their rest after the day's activities. However, things do not work out this way because they are not only engaged with school activities but also with other personal activities which invariable leads to stress.

While some researchers have found that teacher and school-related characteristics may be predictive of biology students' achievement, there is no empirical research on teachers' academic stress and self-concept in the Enugu Education Zone of Enugu State. Therefore, the researcher set out to ascertain the extent to which public secondary school Biology pupils in the Enugu Education Zone of Enugu State's academic accomplishment is predicted by their teacher's academic self-concept and academic stress.

Purpose of the Study

The primary goal of the research was to ascertain how public school biology students' achievement in the Enugu Education Zone of Enugu State is impacted by their teachers' academic self-concept and stress. The study specifically aimed to test the:

1. Predictive power of teachers' academic self-concept on students' achievement in biology.
2. Predictive power of teachers' academic stress on students' achievement in biology.
3. The joint predictive indicator of Biology teachers' academic self-concept and stress on Biology students' achievement.
4. Moderating effect of teachers' gender on their academic self-concept in predicting Biology students' achievement.
5. Moderating effect of teachers' gender on their academic stress in predicting Biology students' achievement.
6. Moderating effect of teachers' gender on the combined academic self-concept and stress in predicting Biology students' achievement.

Hypotheses

The following null hypotheses were formulated for the study and tested at 0.05 level of significance:

HO_1: There is no significant contribution of teachers' academic self-concept to the prediction of students' achievement in Biology.

HO_2: There is no significant contribution of teachers' academic stress to the prediction of students' achievement in Biology.

HO_3: The joint contribution of teachers' self-concept and academic stress are insignificant to the prediction students' achievement in Biology.

HO_4: The moderating influence of gender on teachers' self-concept in predicting students' achievement in Biology is insignificant.

HO_5: The moderating influence of gender on teachers' academic stress in predicting students' achievement in Biology is insignificant.

HO_6: The moderating influence of gender on combined teachers' academic self-concept and academic stress in predicting students' achievement in Biology is insignificant.

Method

The study used an ex-post-facto research design that included correlation. Since the ex-post facto research design does not change any independent variables, it was chosen despite the fact that the condition of the teachers and the outcomes were already known (Sharma, 2019). By using correlational statistics, the correlational thread allowed the researcher to ascertain the link between the variables. This design is thought suitable for research projects like this one. The study was conducted in the Enugu Education Zone of Enugu State. Three local governments make up the Enugu Education Zone: the Isi-uzo Local Government Area, the Enugu–North Local Government, and the Enugu

East Local Government. Along with numerous private secondary schools and a few post-secondary establishments, the zone is home to 33 state secondary schools. The area is an urban/rural area. The occupants of the area are mainly public servants, traders, artisans and farmers. The researcher chose Enugu Education Zone because it houses qualified teachers but gets negative return on students' achievement. This was evident in the literature because they performed poorly in their external examinations. Consequently, this research will help the Biology teachers to combine non cognitive teaching variables in their classroom instructions which in turn intend to enhance good speculative achievement of the students. The population of the study was made up of all 74 biology teachers which consist of 14 male teachers and 60 female educators in the 33 public secondary schools in the zone. There are total students population of 4,737 Biology students which consist of 1805 male students and 2932 female students as recorded by (Post – Primary Schools Management Board Enugu, September 4, 2023). The entire population made up the sample size. This is due to the fact that the population is small and manageable. Hence, there was no sampling. While 10% of the students' population were sampled from the Biology teachers' classroom using simple random sampling techniques. The instrument used in collecting the relevant data was three. They are:

1. Marsh teachers' academic self-concept scale modified by the researcher, 2. Balamurugau and Kumaran academic stress scale modified by the researcher and 3. Students' scores from their unified promotion examination 2022/2023 academic year were used to measure their academic achievement in Biology. A well-structured questionnaire titled, Teachers Speculative Self Concept, Academic Stress and Students Academic Achievement Questionnaire was used. The instruments were adapted by the researcher, teachers' self-concept has a four (4) point scale using real number limit. The four-point scale stood used to answer all the research questions in the questionnaire as shown below. The items were scored on positive and negative cue statements. For positive statement, SA and Exactly true takes 4 points and 5 points respectively and reverse for the negative cue statements. The research questionnaire has two (2) sections A and B. Section A dealt with Personal Data of respondents, while Section B dealt with two (2) cluster of twenty-two (22) and twenty (20) sample questions for self-concept and stress respectively. Face-validity was tested in this study. Three experts received the customized instrument: two experts in Science Education from Enugu State University of Science and Technology (ESUT) and one expert in measurement and evaluation from Alex Ekwueme Federal University, Ikwo. The appropriateness, relevance, and suitability of the items in the instrument were assessed by the experts. Their observations, criticisms and corrections led to the modification of the instrument that will elicit the desired information. A trial testing of the instrument was carried out to determine its reliability. The instrument was distributed to twenty (20) respondents comprising Biology teachers in Enugu South LGA of Enugu State. Enugu South was used to determine the reliability because it had the

category of the sampled population under consideration and also, the region wasn't designated for the investigation. Using Cronbach Alpha statistics, the reliability coefficients of the instruments were ascertained. The reason for choosing this was that the items' scores were not binary. The teachers' self-concept scale yielded a reliability index of 0.92 while teachers' academic stress scale yielded an index of 0.88 coefficients. The overall reliability index was obtained at 0.86. This shows that the instruments are reliable and fit for data collection. Two (2) research assistants that the researcher hired helped with the dissemination and retrieval of the questionnaire. The analysis of the data was done using the Statistical Package for Social Sciences (SPSS) version 22. Simple and moderated regression analysis was used to analyse the data. The null hypothesis was tested at a significant level of 0.05; if the p-value is less than this threshold, the null hypothesis should be rejected; if not, it should not be.

Results

The results were presented in the table below according to the null hypotheses that guided the study. Table 1 shows the un-standardized coefficients with t- and p- values of each predictor and the moderator variables respectively. The table showed that each of the independent variables made a significant contribution to the prediction of academic achievement.

Table 1: ***Relative Contribution of Teachers' Academic Self-Concept and Academic Stress to the prediction of the Academic Achievement of Secondary School Biology Students***

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	52.796	4.917		10.739	.000	42.991	62.602
	Self-concept	.248	.052	.453	4.745	.000	.143	.352
	Stress	-.205	.053	-.371	-3.906	.000	-.310	-.100
	Gender	.276	1.274	.021	.217	.829	-2.264	2.817
2	(Constant)	15.730	24.848		.633	.529	-33.867	65.327
	Self-concept	1.208	.403	2.209	3.000	.004	.404	2.012
	Stress	.225	.377	.407	.597	.552	-.527	.976
	Gender	.191	11.235	.014	.017	.986	-22.234	22.616
	Self-concept*stress	-.012	.006	-1.672	-1.962	.054	-.024	.000
	Gender*Self-Concept	-.132	.126	-.689	-1.048	.298	-.383	.119
	Gender*Stress	.103	.140	.608	.737	.464	-.177	.383
3	(Constant)	161.350	80.145		2.013	.048	1.336	321.364
	Self-Concept	-1.754	1.602	-3.207	-1.095	.278	-4.953	1.445

Stress	-2.280	1.364	-4.124	-1.671	.099	-5.004	.444
Gender	-81.961	44.460	-6.115	-1.843	.070	-170.727	6.806
Self-Concept*Stress	.039	.027	5.435	1.423	.159	-.016	.094
Gender*Self-Concept	1.526	.878	7.959	1.738	.087	-.227	3.278
Gender*Stress	1.508	.749	8.877	2.013	.048	.012	3.004
Gender*Self-Concept*Stress	-.028	.015	-10.315	-1.907	.061	-.058	.001

a. Dependent Variable: Achievement

Hypotheses 1

There is no significant contribution of teachers' academic self-concept to the prediction of students' achievement in Biology. The unstandardized coefficients for the moderator and predictor variables are displayed in Table 4.6 together with their corresponding t- and p-values. The table demonstrated that the independent variable significantly influenced the prediction of biology students' academic performance. Taking into account the degree of involvement, educators' perception of their own academic abilities, the unstandardized coefficient (B =.248) and the standardized coefficient or slope (β =.453) showed a significant difference from 0.000 (t = 4.745; P < 0.05). As a result, while controlling for gender, academic success rose by 25/100 points for every one point rise in instructors' academic self-concept. The null hypothesis was consequently rejected. The academic achievement of pupils in Biology was predicted by the teachers' academic self-concept, which had a statistically significant influence.

Hypotheses 2

There is no significant contribution of teachers' academic stress to the prediction of students' achievement in Biology. The unstandardized coefficients for model 1 are displayed in Table 4.6 together with the corresponding t- and p-values for the moderator and predictor variables. The independent variable significantly influenced the prediction of biology students' achievement, as the table demonstrated. The un-standardized coefficient (B = -.205) and standardized coefficient or slope (β = -.371) were substantially different from 0.000 (t = -3.9056; P < 0.05) when taking into account the degree of contribution and instructors' academic stress. This shows that while controlling for gender, pupils' academic achievement increased by 21/100 for every one point decrease in instructors' academic stress. Consequently, the null hypothesis was disproved. Teachers' academic stress was found to have a statistically significant impact on predicting students' academic progress in Biology.

Hypotheses 3

The joint contribution of teachers' self-concept and academic stress are insignificant to the prediction students' achievement in Biology. Model 2's unstandardized

coefficients are included in Table 4.6 along with the moderator and predictor variables' corresponding t- and p-values. The table demonstrated that there was no statistically significant combined contribution from the independent variable to the prediction of Biology students' achievement. When taking into account the level of contribution, instructors' academic stress and self-concept, the standardized coefficient or slope (β = -1.672) and unstandardized coefficient (B = -.012) did not differ significantly from 0.000 (t = -.017; P > 0.05). This shows that, while controlling for gender, kids' academic achievement increased by 1.2/100 for every unit fall in instructors' academic self-concept and stress. As a result, the null hypothesis was accepted. Teachers' academic stress and self-concept did not significantly contribute to the prediction of students' academic progress in Biology.

Hypotheses 4

Gender has a negligible moderating effect on instructors' self-perception when it comes to forecasting biology students' academic success. Table 1 illustrates how gender modifies teachers' academic self-concept in model 2. Neither the standardized coefficient (β = -.689) nor the unstandardized coefficient (B = -.132) differed statistically significantly from 0.00 (t = -1.048; P > 0.05), indicating that the null hypothesis was not rejected. Consequently, there is no evidence that the moderating effect of gender on teachers' academic self-concept in predicting the academic achievement of secondary school Biology students.

Hypotheses 5

Gender has a negligible moderating effect on instructors' academic stress in terms of predicting biology students' progress. Table 1 illustrates how gender modifies the impact of academic stress on teachers in model 2. Neither the standardized coefficient (β =.608) nor the unstandardized coefficient (B =.103) differed statistically significantly from 0.00 (t =.737; P > 0.05), indicating that the null hypothesis was not rejected. Consequently, it is not noteworthy that gender has a moderating effect on teachers' academic stress in predicting secondary school Biology students' academic achievement.

Hypotheses 6:

When predicting students' achievement in Biology, the moderating effect of gender on the combined instructors' academic self-concept and academic stress is negligible. Table 4.6 illustrates how gender modifies the relationship between academic stress and teachers' self-concept. Neither the standardized coefficient (β = -10.315) nor the unstandardized coefficient (B = -.028) differed statistically significantly from 0.00 (t = -1.907; P > 0.05), indicating that the null hypothesis was not rejected. Thus, it seems unlikely that gender will have a moderating effect on teachers' academic stress and self-concept when it comes to predicting secondary school Biology students' academic achievement.

Discussion of the Findings

The study's findings demonstrated that secondary school biology pupils in the Enugu Education Zone are significantly predicted by the academic self-concept of their professors. The showed in an empirical terms that when there is 1% increase in teachers' self-concept by 1 standard deviation, the students' academic achievement increases by 24%. This shows that teachers' self-concept is a big factor in determination of students' outcome in school. The findings of the study in agreement with the findings of Onah (2023), and Ajmal and Rafique (2018), the academic self-concept was found to positively and significantly predict academic achievement by the researchers. The overall academic success of pupils in biology is positively impacted by teachers' perceptions of their own intellectual abilities.

The study also showed that students' academic success in biology is significantly impacted by teachers' academic stress. The findings presented in Table 3 provided empirical support for the degree of variation in students' academic performance that was linked to instructors' academic stress. The study found that for every standard deviation decrease in teachers' academic stress, students' academic achievement increases by 21%. The result is consistent with Cîrligeanu, (2017); Osagie, (2018), the researchers discovered negative variation of students' achievement as anchored to the teachers' academic stress. Again, the findings of Osagie (2018) disagreed with the present study as the researcher found positive prediction of academic stress with the achievement of the students.

The results further showed that there is no discernible relationship between academic stress and teachers' self-perceptions of their own academic performance and pupils' biological achievement. The result showed that teachers' self-concept cancelled the academic stress to a great extent; the figure displayed showed the empirical evidence. The finding is consistent with the study of Akomolafe and Ogunmakin (2013), who noted non-significant joint prediction of self-concept and locus of control on achievement of the students. The study's findings, which are shown in Table 6, showed that gender had no interaction effect on instructors' self-concept when it came to predicting students' achievement in biology. The results are in line with those of Ajmal and Rafique (2018), who also found no evidence of a substantial relationship between gender and self-concept and academic achievement. This shows that gender is not a factor in self-concept and as such is needed by all genders. Table 6 indicates that the study's findings did not show a significant interaction between gender and academic stress experienced by teachers and students' biology achievement. The finding is consistent with the findings of Cîrligeanu, (2017); Osagie, (2018); who observed non peculiarity of gender to academic stress. Stress is an element of distraction academic wise. On the other hand, the finding differs from that of Osagie (2018) and Jose, Caterina and Diego (2019) who observed that stress is more predominate on female counter part especially the married ones. The researcher attributed this high volume of stress on women to home chores and other required up bringing skills of the children. The study's findings,

which are shown in Table 6, showed that gender had no interaction effect on instructors' perceptions of their own worth and academic stress when it came to predicting students' biology achievement. The results are in line with those of Akomolafe and Ogunmakin (2013), who observed that gender did not significantly influence students' achievement in conjunction with their self-concept and locus of control.

Conclusion and Recommendations

Based on the findings this study, the researcher concluded that teachers' academic self-concept and academic stress significantly predicted students' academic achievement in Biology in Enugu Education Zone. Also the combination of academic self-concept and academic stress has no significant impact on the students' achievement in Biology. Furthermore, Gender has no significant influence on teachers' self-concept and teachers' stress in predicting students' academic achievement in Biology. Finally, the researcher concluded that combination of teachers' academic self-concept and academic stress and gender has no significant impact on the secondary school Biology students'. Based on the findings, the researcher recommended that

1. State ministry of education in teamwork with post primary schools management board should organize seminars and workshop to help teachers to boost their self-concept will encourage them to develop positive self-concept that help them in teaching Biology.
2. Biology teachers should engage students with education activities, in such a way that it will help them develop positive self-concept.
3. State departments of health and education should plan school intervention programmes that will save teachers from the adverse effects of stress.
4. The findings if utilized by health educators, will enable them develop appropriate methods and approaches in teaching and handling of stress and stress problems of both teachers and students. This will enable teachers inculcate in themselves the desired knowledge, attitudes and skills necessary in dealing with stress.

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