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MATHEMATICS COGNITIVE FAILURE AND MATHEMATICS ANXIETY: ANY CORRELATION IN NIGERIAN SENIOR HIGH SCHOOL SAMPLE?

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Abstract

This study through a positivism philosophy within a quantitative approach of a descriptive survey of a correlational type investigated the relationship between mathematics cognitive failure and mathematics anxiety among 1129 senior high school students in Nigeria. Three hypotheses were postulated and tested at 1% level of significance using Pearson product moment correlation coefficient and simple linear regression. Two valid and reliable instruments which included mathematics cognitive failure questionnaire (Cronbach α=0.96) and mathematics anxiety scale (Cronbach α=0.95) were used for data collection. Results showed that there was a statistically significant relationship between mathematics cognitive failure and mathematics anxiety among senior high school students over a five-year period (2020-2024). Additionally, there was a statistically significant relationship between mathematics cognitive failure and mathematics anxiety of senior high school students based on field of study (Science and Non-Science). There was a statistically significant predictive influence of mathematics cognitive failure on senior high school students' mathematics anxiety across the five-year period. Based on these results, it was recommended that future studies should consider the potential mediators of parental involvement and teacher support in the relationship between mathematics cognitive failure and mathematics anxiety. Future studies should explore neural mechanisms underlying mathematics cognitive failure.

Keywords: Mathematics cognitive failure, Mathematics anxiety, Nigeria, Senior high school, Students

Introduction

The entrance of mathematics into the school curriculum has generated curiosity on the part of the teachers in the evaluation of students' errors in mathematics. Teachers' interest has become more profound due to students' poor performance in mathematics, which has been attributed to avoidable errors often committed by the students. In general, Olivier (1989) confirmed the differences among misconceptions, slips, and errors. Misconceptions are false impressions or mistaken beliefs that are often associated with supposition constructions that generate errors. Slips are mistakes or incorrect solutions due to processing, made by both amateurs and specialists, though easily detected and amended, they are not orderly but are sloppily and occasionally made. Errors are mistakes or incorrect solutions due to planning and are orderly because they are used perpetually in the same context. Clearly, errors are not only indicators of pseudo-constructs (Moru et al., 2014), they are outcomes of people-troubled cognitive functioning or data refinement (Parker et al., 1995). Individual discrepancies in cognitive capacity can generate various degrees and categories of mistakes often term errors that people make in similar context (Awofala, Lawal, & Arigbabu, 2020; Allahyari et al., 2008). In mathematics, errors are categorised into didactical and mathematical (Legutko, 2008).

Didactic error refers to the context in which teachers' behaviours are in conflict with the procedural, educational, and collective logic rules. It is the wrong adoption of mixture of examples in construct formation and incoherent algorithm of instruction such as instructing higher-order constructs of abstraction before the lower-order concrete concepts (Legutko, 2008). Mathematical errors involve taking false mathematical sentences as true. Mathematical errors are improper adoption of mathematical terminologies, generalising once noticing a few specific cases, making erroneous applications of the definitions, and defining mathematical constructs wrongly (Legutko, 2008). Mathematical errors are distinguished into three namely executive, structural, and arbitrary (Orton, 1983).

Arbitrary error refers to inaccuracy or mistake that occurs unintentionally or randomly, often results from unpredictable circumstance or human factor. Mistakes in writing or typing numerical values, incorrect use of positive/negative signs, and mistakes in arithmetic operations of division, multiplication, subtraction, and addition can results into arbitrary errors. Structural error refers to a fundamental mistake or flaw in the underlying mathematical reasoning, logic, or structure. For instance, when students fail to correctly apply mathematical formulas or theorems, and misunderstanding of mathematical properties such as associativity and commutativity can result into structural errors. Executive error refers to an advanced cognitive mistake that involves decision-making, strategic planning, and thinking. Students failing to identify key variables or constraints in mathematics problems, misinterpretation of a word problem's context, and using an inefficient or inappropriate mathematical method are all examples of executive errors.

Mathematics cognitive failure

Clearly, errors due to cognition is an important factor in students' underachievement in mathematics (Awofala, Lawal, & Arigbabu, 2020). Students are often faced with misdirected actions, or a challenge of memory failure, or perceptual failure, when solving mathematical problems. With this, the intentions to solve mathematics problems do not seem to match the actual practices in mathematics as students become befuddled regarding the solution steps to take. This condition should not be misconstrued to a lack of capability as the actual capability to engage mathematical problems is present in the students. However, errors of cognition may be at work to produce a failure in ostensibly amusing easy undertakings, which students could solve naturally by not committing errors or doing it wrongly. These errors of cognition termed mathematics cognitive failures (Awofala & Odogwu, 2017) consist of lapses of memory, deviated attention, action slips, daydreaming, decreased consciousness level, spacing out, forgetfulness, and episodes of absent-mindedness which could interfere with finding solutions

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to mathematical problems (Awofala, Lawal, & Arigbabu, 2020). Mathematics cognitive failure is described as a difficulty or an error in mathematical processing, problem-solving, and mathematical thinking. It is an individual difference in disposition to mistakes and errors in mundane problem-solving and mathematical activity. Cognitive failure in mathematics is memory, attentional, perceptual, and activity-dependent interruptions of consciousness connected to mathematics undertakings (Awofala, Lawal, & Arigbabu, 2020). As a derivative of cognitive failure (Broadbent et al., 1982), mathematics cognitive failure refers to the powerlessness in gorgeously solving mathematical problems that an individual possesses the natural ability to solve regularly. Mathematics cognitive failures include different types of mathematics implementation lapses such as lapses in mechanical function (e.g., action slips, or accidental actions); lapses in memory (confusion regarding information recovery), and lapses in attention (flops in comprehension and discernment) (Awofala, Lawal, & Arigbabu, 2020).

There are four sources of mathematics cognitive failures as postulated in the literature and these include distractibility, motor-function lapses, memory dysfunction, and lack of concentration (Awofala & Odogwu, 2017). Distractibility is activated by revery and beguilement in mathematics. Motor function lapse is incapacity to take bold steps in mathematics and the execution of unwitting act. Dysfunction of the memory is caused by blackout and hesitancy in thinking about mathematics. The low concentration might be the result of low attention span and low capacity for mathematical thoughts. As a cognitive-based error linked with lapse in mathematical awareness, mathematics cognitive failure seems to evoke similar elements of clinical mathematical problems often connected with mathematics anxiety. Both mathematics anxiety and mathematics cognitive failures are concerned with action syndromes, control of thought, memory, and attention.

Mathematics anxiety

Mathematics anxiety has a long history in connection with mathematics performance. In this study mathematics anxiety is taken to mean the feeling of discomfort, tension, and fear in relation to mathematics activities in which these feelings impede the performance of mathematical tasks. It can be said that mathematics anxiety invokes strong emotional reactions to mathematics activities (Awofala, Akinoso, Adeniyi, Jega, Fatade, & Arigbabu, 2024; Awofala, 2017; Sopekan & Awofala, 2019), thus creating a debilitating effect for the students. Low mathematics anxiety precipitates high mathematics achievement while high mathematics anxiety precipitates low mathematics achievement ((Dreger & Aiken, 1957; Hembree, 1990; Ashcraft & Kirk, 2001; Artemenko, Daroczy, & Nuerk 2015; Awofala & Akinoso, 2017). This inverse relationship between mathematics anxiety and mathematics performance is stable at all levels of education. While numerous studies have established the negative relationship between mathematics anxiety and mathematics performance (Ramirez, Gunderson, Levine & Beilock, 2013; Beall, Roebuck, & Penkalsky, 2015; Artemenko, Daroczy, & Nuerk 2015), only two studies have been conducted on mathematics cognitive failures.

Relation between mathematics cognitive failure and mathematics anxiety

The first study was on the relationship between mathematics cognitive failures and mathematics anxiety among preservice teachers (Awofala & Odogwu, 2017). The second study was on the learning style differences in mathematics cognitive failures among future mathematics teachers (Awofala, Lawal & Arigbabu, 2020).

In the first study, it was established that there was a positive relationship between mathematics cognitive failures and mathematics anxiety among preservice mathematics teachers. In the study of Awofala and Odogwu (2017), the participants were preservice mathematics teacher who were adults in their own right. It is yet to be established the relationship between mathematics cognitive failures and mathematics anxiety among senior high school students who are teenagers. It is established that the preservice teachers with high level of mathematics cognitive failures usually displayed an advanced frequency of a more weakening emotional indication of mathematics anxiety (Awofala, 2019; Awofala, & Odogwu, 2017). It is deduced from the work of Awofala and Odogwu (2017) that difficulty with mathematical problem-solving or processing orchestrated by mathematics cognitive failures can create a sense of helplessness, fueling mathematics anxiety. Also, the fear of making mistakes or not understanding mathematical concepts may contribute to mathematics anxiety. Additionally, repeated experiences of mathematics cognitive failures can lead to increased mathematics anxiety.

The focus of the present study was to investigate the relationship between mathematics cognitive failures and mathematics anxiety among Nigerian senior high school students. Many factors have been found to contribute to mathematics anxiety and they include: insufficient practice or reinforcement in mathematics, inadequate learning strategies, lack of confidence, fear of failure, and negative self-perception (Awofala et al., 2024; Awofala & Odogwu, 2017; Awofala & Akinoso, 2017; Estonanto & Dio, 2019; Awofala, Johnson, & Akinoso, 2025). The contribution of mathematics cognitive failures to mathematics anxiety in senior high school students is yet to be established. It is noted that addressing mathematics cognitive failure and mathematics anxiety can lead to better mathematics understanding, problem-solving skills, and critical thinking. Identifying factors contributing to mathematics anxiety can help educators create supportive learning environments, reducing stress and promoting student well-being. Unraveling the association between anxiety towards mathematics and mathematics cognitive failure can inform teaching strategies to lessen fear and increase mathematics learning outcomes. Unraveling the connection between mathematics cognitive failure and mathematics anxiety can help in breaking the vicious cycle: mathematics anxiety→avoidance of mathematics→lack of practice in mathematics→mathematics cognitive failure→increased mathematics anxiety.

Hypotheses

H_{01}: There is no statistically significant relationship between mathematics cognitive failure (MCF) and mathematics anxiety of senior high school students based on year of investigation.

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H_{02}: There is no statistically significant relationship between mathematics cognitive failure (MCF) and mathematics anxiety of senior high school students based on discipline of study (non-science and science).

H_{03}: There is no statistically significant predictive influence of mathematics cognitive failure (MCF) on senior high school students' mathematics anxiety.

Method

This study adopted a positivism philosophy within a quantitative approach of a descriptive survey of a correlational type (Awofala, Bazza, Akinoso, Olaguro, Fatade, & Arigbabu, 2024).

Participants

The population of grade 12 students in the large senior high school in Lagos metropolis for the years 2020, 2021, 2022, 2023, and 2024 were 193, 202, 230, 240 and 264 respectively. All the grade 12 students that formed the population were used as sample for the study. So, the participants were 1129 grade 12 students from one large senior high school in Lagos metropolis, Nigeria between 2020 and 2024 covering a five year period. Table 1 showed the gender distribution over the 5 year period. The senior high school students could also be categorised as the non-science (758) and science (371) groups (Table 2). Presently in Nigeria, there are four fields of study at the senior high school level namely: Science and Mathematics field; Humanities field; Technology field; and Business Studies field (Awofala & Sopekan, 2013). In this study, science and mathematics and technology fields of study were merged as science group while humanities and business studies fields of study were merged as non-science group for easy categorisation. The ages of the participants ranged from 14 to 19 years.

Table 1. Distribution of Sample by Year and Gender

	N (%)		
Year	Male	Female	Total
2020	98 (50.8)	95 (49.2)	193 (100)
2021	102 (50.5)	100 (49.5)	202 (100)
2022	120 (52.2)	110 (47.8)	230 (100)
2023	125 (52.1)	115 (47.9)	240 (100)
2024	130 (49.2)	134 (50.8)	264 (100)
Total	575 (50.9)	554 (49.1)	1129 (100)

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Table 2. Distribution of Sample by Year and Science and Non-Science Group N (%)

Year	Science	Non-Science	Total
2020	58 (30.1)	135 (69.9)	193 (100)
2021	68 (33.6)	134 (66.4)	202 (100)
2022	75 (32.6)	155 (67.4)	230 (100)
2023	82 (34.2)	158 (65.8)	240 (100)
2024	88 (33.3)	176 (66.7)	264 (100)
Total	371 (32.9)	758 (67.1)	1129 (100)

Research Instruments

Two research instruments were used in this study and they included: Mathematics Cognitive Failure Questionnaire (MCFQ) and Mathematics Anxiety Scale (MAS). The MCFQ was adopted from Awofala and Odogwu (2017) and was hinged on a five-point Likert scale ranging from: Very often -5, Quite often -4, Occasionally -3, Very rarely -2, to Never -1. The MCFQ has 25 items and the internal consistency reliability coefficient of the items of MCFQ was computed using the Cronbach alpha (α) with a value of 0.94. The MAS was adopted from Wigfield and Meece (1988) and contained 11 items on a 5-point Likert scale ranging from: Not at all - 1, A little -2, A fair amount -3, Much -4 to Very much -5. The MAS, which has two components (worry and negative affective reaction) had been validated for Nigerian use with an internal consistency reliability coefficient of 0.94 as its Cronbach alpha (α) value (Awofala & Odogwu, 2017; Awofala & Akinoso, 2017; Awofala, 2020). In the present study, the internal consistencies of the two standardised measures were computed using Cronbach alpha with 100 senior high school students not part of the study sample. The reliability coefficient of the MCFQ was 0.96 while that of the MAS was 0.95 and these coefficients were considered good for the study.

Procedure for data Collection

The data collection process spanned a period of four years starting from the year 2020 to year 2024. In each year, the MCFQ and MAS were administered by the author to the graduating grade 12 students in the popular senior high school in the Lagos metropolis and the filled measures were kept for analysis. Permission to use the grade 12 students for research was sought from the management of the school and approval was given in each year. Informed consent forms were sent to the parents of the students since they were teenagers. This study adhered to institutional review board guidelines and regulations. Informed consent was obtained from all participants and their parents prior to the collection of data for the study. Anonymity and confidentiality of the participants were maintained throughout the period of data collection. In short all ethical considerations were observed in the study.

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Data Analysis

The raw data from the field were coded on the SPSS version 25. There were no missing scores as all the measures were filled appropriately by the participants. The first two hypotheses of the study were tested using the Pearson Product Moment Correlation Coefficient (PPMCC) while the third hypothesis was tested using the linear regression at 1% level of significance.

Results

Null Hypothesis One: There is no statistically significant relationship between mathematics cognitive failures and mathematics anxiety of senior high school students based on the year of investigation.

Table 3. Mathematics Cognitive Failure (MCF) and Mathematics Anxiety (MA) Mean Scores, Standard Deviations, and r-values for each Year

Year	MCF		MA			
	M	*SD*	*M*	*SD*	*r*	*p-value*
2020	70.42	19.26	33.44	8.38	.646**	0.000
2021	70.37	19.19	33.41	8.39	.650**	0.000
2022	69.95	19.26	33.24	8.48	.646**	0.000
2023	70.13	19.13	33.44	8.51	.649**	0.000
2024	70.18	19.25	33.44	8.41	.648**	0.000

**Correlation is significant at the 0.01 level (2-tailed)

Table 3 displays the mean scores and standard deviations for mathematics cognitive failure and mathematics anxiety together with the r-value for each year of enquiry. It can be seen that for each year there was a positive relationship between mathematics cognitive failure and mathematics anxiety. However, these relationships were not only positive but statistically significant (p<.01) in the five year period starting from 2020 to 2024. Hence, there was a direct relationship between mathematics cognitive failure and mathematics anxiety for each year starting from 2020 to 2024.

Null Hypothesis Two: There is no statistically significant relationship between mathematics cognitive failure and mathematics anxiety of senior high school students based on field of study (Science and Non-Science).

In terms of the science and non-science classification, it is observable from Table 4, that there was a positive relationship between mathematics cognitive failure and mathematics anxiety and these relationships were statistically significant. Thus, there was a direct relationship between mathematics cognitive failure and mathematics anxiety for science and non-science groups for each year starting from 2020 to 2024. The correlation value for the science group on the relationship between mathematics cognitive failure and mathematics anxiety was consistently higher than the correlation value for the non-science group in each year of study.

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Table 4: Mathematics Cognitive Failure (MCF) and Mathematics Anxiety (MA) Mean Scores, Standard Deviations, and r-Values for each Year and Science and Non-Science Groups

Year	Group	MCF *M*	MCF *SD*	MA *M*	MA *SD*	*r*	*p-value*
2020	Science	69.33	20.57	33.16	7.94	.662**	0.000
	Non-Science	70.90	18.73	33.56	8.58	.641**	0.000
2021	Science	69.04	20.16	32.96	8.05	.676**	0.000
	Non-Science	71.04	18.72	33.63	8.57	.638**	0.000
2022	Science	62.29	19.94	33.20	7.98	.677**	0.000
	Non-Science	70.26	18.98	33.27	8.74	.634**	0.000
2023	Science	69.79	19.86	33.76	8.26	.682**	0.000
	Non-Science	70.30	18.80	33.27	8.66	.634**	0.000
2024	Science	69.69	19.69	33.74	8.19	.688**	0.000
	Non-Science	70.43	19.08	33.28	8.53	.630**	0.000

*$p < .05$

Null Hypothesis Three: There is no statistically significant predictive influence of mathematics cognitive failure on senior high school students' mathematics anxiety.

Table 5 shows the predictive influence of mathematics cognitive failure on mathematics anxiety for the year 2020 to 2024. The ANOVA regression analysis (Table 5) for each year showed a significant influence of mathematics cognitive failure on senior high school students' mathematics anxiety ($F_{(1, 191)}$=136.65, p=0.000) for the year 2020; ($F_{(1, 200)}$=146.28, p=0.000) for the year 2021; ($F_{(1, 228)}$=163.56, p=0.000) for the year 2022; ($F_{(1, 238)}$=173.41, p=0.000) for the year 2023; and ($F_{(1, 262)}$=189.87, p=0.000) for the year 2024. The mathematics cognitive failure investigated contributed as much as 41.7% (with β=0.65, t=11.69, p<0.001) in the year 2020; 42.2% (with β=0.65, t=12.10, p<0.001) in the year 2021; 41.8% (with β=0.65, t=12.79, p<0.001) in the year 2022; 42.1% (with β=0.65, t=13.72, p<0.001) in the year 2023; and 42.0% (with β=0.65, t=13.78, p<0.001) in the year 2024 to senior high school students' mathematics anxiety.

Table 5. Predictive influence of mathematics cognitive failure on senior high school students' mathematics anxiety

YEAR 2020

R =.646	**R^2 =.417**	**Adjs R^2=.414**	**Stand. Error Est=6.41**	**$F_{(1, 191)}$=136.65**	**P < 0.001**
Variable	**B**	**S.E**	**Beta**	t	Sig.
Constant	13.66	1.75		7.79	.000
MCF	0.28	0.24	0.65	11.69	.000

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YEAR 2021

$R = .650$	$R^2 = .422$	Adjs $R^2 = .420$	Stand. Error Est=6.39	$F_{(1, 200)} = 146.28$	$P < 0.001$
Variable	**B**	**S.E**	**Beta**	t	Sig.
Constant	13.42	1.71		7.83	.000
MCF	0.28	0.02	0.65	12.10	.000

YEAR 2022

$R = .646$	$R^2 = .418$	Adjs $R^2 = .415$	Stand. Error Est=6.49	$F_{(1, 228)} = 163.56$	$P < 0.001$
Variable	**B**	**S.E**	**Beta**	t	Sig.
Constant	13.34	1.62		8.26	.000
MCF	0.29	0.022	0.65	12.79	.000

YEAR 2023

$R = .649$	$R^2 = .421$	Adjs $R^2 = .419$	Stand. Error Est=6.49	$F_{(1, 238)} = 173.41$	$P < 0.001$
Variable	**B**	**S.E**	**Beta**	t	Sig.
Constant	13.18	1.59		8.27	.000
MCF	.29	0.02	0.65	13.17	.000

YEAR 2024

$R = .648$	$R^2 = .420$	Adjs $R^2 = .418$	Stand. Error Est=6.41	$F_{(1, 262)} = 189.87$	$P < 0.001$
Variable	**B**	**S.E**	**Beta**	t	Sig.
Constant	13.51	1.50		9.08	.000
MCF	.28	0.02	0.65	13.78	.000

The regression analysis equation is as follows: mathematics anxiety $_{predicted}$ = 13.66 + 0.28 mathematics cognitive failure for the year 2020. So, one unit increase in mathematics cognitive failure results in a 0.28 increase in mathematics anxiety. For the year 2021, the regression equation is mathematics anxiety $_{predicted}$ = 13.42 + 0.28 mathematics cognitive failure. A unit increase in mathematics cognitive failure would result in a 0.28 rise in mathematics anxiety. For the year 2022, the regression equation is mathematics anxiety $_{predicted}$ = 13.34 + 0.29 mathematics cognitive failure. A unit increase in mathematics cognitive failure would result in a 0.29 rise in mathematics anxiety. For the year 2023, the regression equation is mathematics anxiety $_{predicted}$ = 13.18 + 0.29 mathematics cognitive failure. A unit increase in mathematics cognitive failure would result in a 0.29 rise in mathematics anxiety. For the year 2024, the regression equation is mathematics anxiety $_{predicted}$ = 13.51 + 0.28 mathematics cognitive failure. A unit increase in mathematics cognitive failure would result in a 0.28 rise in mathematics anxiety.

Discussion

Investigations into the relationships between mathematics cognitive failure and mathematics anxiety were carried out with samples from senior high school students in Nigeria over a period of 5 years (2020-2024). Results showed that, in each year, there was a statistically significant relationship between mathematics cognitive failure and senior high school students'

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mathematics anxiety. More so, in each year of investigation there was a statistically significant relationship between mathematics cognitive failure and senior high school students' mathematics anxiety with regards to science and non-science groups. Only one study has been reported regarding the relationship between mathematics cognitive failure and mathematics anxiety. For instance, Awofala and Odogwu (2017) reported a statistically significant relationship between mathematics cognitive failure and mathematics anxiety among preservice mathematics teachers in Nigeria.

The present study is the first to be conducted on the relationship between mathematics cognitive failure and senior high school students' mathematics anxiety. This study showed that there was a direct relationship between mathematics cognitive failure and mathematics anxiety among senior high school students in Nigeria. This means that an increase in mathematics cognitive failure could lead to a corresponding increase in senior high school students' mathematics anxiety.

Additionally, the present study showed that mathematics cognitive failure was a statistically significant predictor of mathematics anxiety across the five year periods. There are many predictors of mathematics anxiety such as COVID-19 depression and COVID-19 fear (Awofala & Ogunsanya, 2025), nomophobia and smartphone addiction (Awofala & Esealuka, 2021; Adebiyi, Awofala & Malik, 2024), mathematical attainment (Field, Evans, Bloniewski, & Kovas, 2019), previous mathematics experience (Marks, 2022; Vargas, 2021), parental and teacher influences (Prahmana, Sutanti, & Diponegoro, 2021), low mathematics self-efficacy (Mehmet & Hulya, 2021; Onoshakpokaiye, 2023), fixed mindset (Awofala & Akinoso, 2024; Marks, 2022), difficulty with problem-solving (Vargas, 2021), spatial reasoning (Kour, & Rafaqi, 2024), stereotype threat (Kour, & Rafaqi, 2024), and general anxiety (Awofala & Odogwu, 2017; Kour, & Rafaqi, 2024). None of these studies had found that mathematics cognitive failure was a predictor of mathematics anxiety in senior high school students.

The predictive influence of mathematics cognitive failure on mathematics anxiety among senior high school students in this study can be substantiated. Mathematics cognitive failure enhances frustration and disappointment which can create a lasting impression, reinforcing mathematics anxiety. Repeated failures or struggles in mathematics orchestrated by mathematics cognitive failures may lead to negative emotions and decreased confidence thereby enhancing mathematics anxiety. Mathematics cognitive failure thrives in the environment of lack of understanding and control and this could lead to feelings of helplessness thereby reinforcing mathematics anxiety.

Mathematics cognitive failure can make senior high school students feel overwhelmed and uncertain and this can aggravate mathematics anxiety. Mathematics cognitive failure can lead to negative self-talk (e.g., " I am not good at mathematics") and this negative self-perception can reinforce mathematics anxiety, creating a self-fulfilling prophecy. Mathematics cognitive failure involves committing errors or making mistakes (Awofala & Odogwu, 2017) and the fear of being wrong or making mistakes in mathematics can lead to social anxiety capable of aggravating mathematics anxiety. Mathematics cognitive failure can erode confidence in

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mathematics abilities and the decreased self-efficacy can make students more susceptible to mathematics anxiety. Mathematics cognitive failure can exacerbate stress and anxiety responses and the heightened arousal can impair mathematics performance, creating a vicious cycle. Mathematics cognitive can lead to avoidance of mathematics-related tasks and the avoidance can reinforce mathematics anxiety, making it more challenging to overcome.

Conclusion

This study might have suffered from sampling limitation. This is because the study was restricted to senior high school students in the south-west geopolitical zone of Nigeria and this could limit generalisability to the remaining five regions in Nigeria. Methodological limitations of the study included that a correlational design was used and this design could not establish causality between mathematics anxiety and mathematics cognitive failure. Additionally, this study relied on self-report measures of mathematics anxiety and mathematics cognitive failure which could potentially be subject to prejudices. More so, findings might be specific to Nigerian senior high school context and findings might not be generalisable to other age groups (e.g., tertiary and primary students). It is anticipated that this study would be replicated in the other five geopolitical zones of Nigeria for meaningful generalisation of the findings and investigations into potential mediators such as parental involvement and teacher support should be carried out. Future studies should explore neural mechanisms underlying mathematics cognitive failure. Also, studies should examine developmental trajectories of mathematics cognitive failure and mathematics anxiety. These limitations notwithstanding, the findings of this study should be interpreted in context, and future researches should address these gaps in order to enhance our understanding of the relation between mathematics cognitive failure and mathematics anxiety among Nigerian senior high school students.

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