PSYCHOSOCIAL AND SEIZURE-RELATED FACTORS AS PREDICTORS OF COGNITIVE FUNCTIONING CHANGES AMONG NEWLY CLINICALLY DIAGNOSED CHILDREN AND ADOLESCENTS WITH SEIZURE DISORDER IN LAGOS, NIGERIA

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ABSTRACT

Cognitive decline is a concern among individuals diagnosed with seizure disorder. Duration of the illness before commencing treatment, seizure frequency, and medication are also factors that have been associated with the condition. The nature, characteristics, course, and effects of these factors are of growing interest among newly diagnosed children and adolescents with seizure disorders. These factors can have adverse psychological consequences on this population, thus compromising the capacity to acquire adequate skills for survival and increasing the possibility of ending up as a burden to caregivers. Extant literature focused on seizure disorders among adults; this study, therefore, investigated psychosocial predictors (age, perceived stigmatization, perceived discrimination, and self-esteem) of changes in cognitive function among children and adolescents newly diagnosed with seizure disorder.
Cognitive Reserve, Passive models, Functional Working Memory, Self-concept, and Sociometer theories guided the study, while a descriptive survey design was adopted. Sixty children between the ages of five years and sixteen years newly diagnosed with seizure disorder at the Child and Adolescents Mental Health Centre of Federal Neuropsychiatric Hospital were purposively selected. A structured questionnaire comprising Children's self-concept scale (α=0.73), Weschler Intelligence Scale for Children version 4 (WISC-IV) Verbal (α=0.94), Performance (α=0.90), and Full scale (α=0.96) was administered to the participants. Data were analyzed using ANOVA, Pearson Product Moment Correlation, and Hierarchical regression at p<0.05.
The participants' age was 12.3 years ± 2.3. There was a significant positive relationship between age (r = .38), perceived discrimination (r = .59), and cognitive functioning. Perceived discrimination, self-esteem, and perceived stigmatization significantly predicted cognitive functioning among children and adolescents with seizure disorder. (R^2= 0.35, ΔR^2 = 0.32. F = 10.76, df = 3,6). Perceived discrimination (β= .67, t =3.72), age (β = 9.6, t =2.49), self-esteem (β=.02, t= 0.98), and Perceived stigmatization (β = .082. t =2.75) had independent significant contributions to cognitive functioning changes among children and adolescents with seizure disorder. Seizure disorder factors revealed that type of seizure, onset of seizure, and frequency of seizure contributed significantly to the change observed in the prediction of cognitive functioning (R^2= 0.41, ΔR^2 = 0.34, F = 6.52, df =6,57).
Perceived stigmatization, Perceived discrimination, and self-esteem were decisive factors that determine cognitive function changes among newly clinically diagnosed children and adolescents with seizure disorder in Lagos. The public should be enlightened about the danger of stigmatization and discrimination of children and adolescents with seizure disorder through psycho-educational programs for parents and caregivers.

Keywords: *Cognitive functioning, Perceived discrimination, Self-esteem, Perceived stigmatization, Seizure*

INTRODUCTION

Seizure disorder is a wide-ranging group of neurodegenerative conditions defined by recurrent fits of convulsions (Adamolekun, 2022; Chang & Lowenstein, 2003). Specifically, it is characterized by an aberrant electrocardiographic sequence (EEG) and an abrupt, uncontrolled, short-lived shift in behaviours, muscular activities, parasympathetic performance, awareness, or sensations (World Health Organization, 2022; Thompson & Osorio, 2005). However, given the multifarious effects that the condition can have on the total person and not only on the anatomy and physiology, newer definitions have considered it as a progressive disorder in which patients can transition from one symptom to another, with recognition of the degree of disability. Thus, it can be defined as a brain ailment characterized by a persistent propensity to create epileptic fits and thereby affect the endocrine, intellectual, emotional, and social functioning of this individual (International League Against Epilepsy (ILEA) 2010). It is

the second most common neurological disorder in the world, with about a 1% incidence rate, and it is a major medical and psychological problem.
Historically, seizure disorder was considered a sacred sickness caused by a spirit invading the body, and its occurrence was linked to the periodic influences of heavenly bodies, especially the moon. The beliefs associated with the causation of seizure disorder influenced public attitudes and shunned, stigmatized, and misdiagnosed epileptic clients (Kaddumukasa, 2021; Otte, 2012). These beliefs and attitudes have a lot of implications, including the refusal of burial in family graves in some cultures, e.g., Madagascar. There are associated feelings of sadness, anxiety, and low self-worth leading at times to suicide. Individuals with a seizure disorder are likely to lose their jobs, find it difficult to marry, lose their wives or husbands, and drop out of school. Seizure disorder can cause particular strains, just like other chronic diseases that can appear in spurts (like asthma). To be more specific, convulsions can happen anywhere and at any moment. Furthermore, the seizures are linked to major humiliation and a decline in self-respect.
It has been postulated that the disorder's associated unpredictability causes a shift in the patient's sense of agency. Seizure patients, compared to both healthy controls and patients with other diagnoses (such as diabetes), have been observed to exhibit a greater external locus of control (Boddu, 2021). Another personal risk factor for epilepsy is how an individual processes and makes sense of his or her illness. One of the strongest predictors of negative adjustment in individuals who have epilepsy is a fear of having seizures (Weiss, 2022). There is a wide range of patients' abilities to cope with epilepsy and their available resources. Some people with epilepsy are able to live their lives largely unhindered by the condition, while others harbor bitterness, falsely believe that epilepsy has destroyed their lives, and live in constant fear of having a seizure. Several researchers have proposed a link between these traits and a person's emotional and social well-being (e.g. Olley, 2004; Akinsulore, 2010). Friends, relatives, and even strangers may treat people with epilepsy quite differently just because of the diagnosis. This asymmetrical care can be well-intentioned in some situations and aggressive in others, but in any case, it stands to disrupt the patient's transition. It is possible that parents of children with epilepsy will go to great lengths to shield them from the world. Family dynamics and the parents' hopes for the child may change as a result (Yang, 2020). Because of the fear of seizures, the youngster may be the target of bullying, harassment, and social exclusion at school. These changes in growth must be considered as possible risk factors for poor adjustment.
The most obvious of the extra-personal psychosocial risk factors is stigma and discrimination against people who have seizure disorder; this manifests itself in a variety of ways, including the outright rejection of the person with seizure disorder by their peers, barriers to entry into certain professions, and prejudice against them in everyday life. Sociologists have recently started talking about stigma and prejudice in terms of whether they are genuine or perceived. This distinction may represent a blend of overt and covert forms of discrimination. People with seizure disorder may be more vulnerable to experiencing multiple stressful events at once. Furthermore, it would appear that financial stress is an additional risk factor, considering the financial burdens of this chronic medical condition and the greater likelihood of work difficulties (National Commission for the Control of Epilepsy and its Consequences, 1978).
Around 60 million individuals across the globe have seizure disorders, with an estimated prevalence rate varying from 20 to 70 per 100,000 (WHO, 2022). The peak age for onset is in infancy. There is an estimated 5% incidence of neurological conditions in Africa. In Nigeria, the prevalence rates vary between 8 per 1000 (Owolabi et al, 2019), with most (between 70% and 85%) of the patients with seizure disorder having the first onset before age 30. About 82% of children with SD have their first diagnosis before age 5. There are different opinions on what constitutes a seizure disorder; some say that repeated, uncontrolled seizures are necessary for a diagnosis, while others say that a singular occurrence coupled with brain abnormalities that

raise the risk of subsequent convulsions is sufficient. Seizures are brought on by brain stimulation that is either excessive or too synchronized (American Academy of Neurology, 2012). Jackson (1981) established the contemporary description of seizure disorder as "an irregular, uncontrolled, and chaotic release of neural tissue." Jackson observed, "This outpouring appears in all intensities; it happens with all types of health issues at all ages and in countless situations."

It is well-established that a proportion of people with seizure disorders have cognitive deficits. Memory and word-finding issues are typical cognitive complaints, but all cognitive areas might be impaired (Ogunrin et al., 2010). Another thing to think about is whether this mental decline stays the same or gets worse over time. Meta-analysis of longitudinal studies measuring cognitive development throughout time in children with seizure disorder found support for the advancement of cognitive abnormalities related to long-term seizure disorder (Seidenberg et al., 2007). Furthermore, many investigations have established that, in contrast to healthy controls, persons with seizure disorders frequently fail to exhibit positive effects on conventional neurological testing (Fiest et al. 2016, Helmstaedter et al. 2017, Titiz et al. 2014, etc.). In other words, whereas healthier people's scores often rise after being subjected to a test twice, those with seizure disorder do not show any signs of improvement. Furthermore, at least two investigations have demonstrated a clear cognitive decrease with repeated testing. (Novak et al, 2022, Hie et al., 2008). Similarly, there have also been concerns about predictors, especially psychosocial predictors, and their roles in cognitive functioning among children with newly diagnosed seizure disorders (Piers, Harris, & Herzberg, 2010; Chang, 2003; Olley, 2004; Hoare and Kerly, 1991). Self-concept, self-perception, and self-worth are identified as psychosocial concepts in the developing child (Piers-Harris, 2010). Specifically, family backgrounds, emotional adjustment, interpersonal adjustment, behavioral adjustment, academic adjustment, adjustment to seizures, popularity (social functioning), and happiness have been identified as psychosocial factors related to seizures.

Also, modal cognitive assessments have been made for a number of different types of epilepsy, and research has been done to figure out which cognitive deficits are common and which are rare (Lassonde et al., 2000; Nolan et al., 2003; Elger et al., 2004).

Also, there is much worry about the possibility of cognitive decline in people with seizure disorder, especially those with severe forms of the disorder that are resistant to treatment (Pitkanen & Sutula, 2002)..There is some evidence for this (Dodrill, 2004), so it is worth thinking about the cognitive foundation that chronic seizure disorder could later erode. Children and adolescents who have had a chronic seizure disorder for significantly shorter periods have been shown in controlled trials to suffer significant neuropsychological disorders (Knieriem, 2015; Vrinda et al. 2019; Schoenfeld et al., 1999), suggesting that seizure disorder has an adverse effect on neurodevelopment and cognition from a young age. However, characterization of this extremely early cognitive substrate is necessary in order to acquire a clearer perspective on the potential progressive and lifetime neuropsychological implications of epileptic seizures.

So, studies of children who have just been told they have seizure disorders are likely to add a lot to this body of work. Few studies have looked at cognitive abilities in children with newly diagnosed seizure disorder. It appears that few studies could detect cognitive impairments at the outset of seizure disorder, and discrepancies in findings may be due, at least in part, to differences in study populations' ages, test batteries, and epileptic features. Academic underperformance prior to and at the outset of idiopathic epilepsy (Berg et al., 2005; McNelis et al., 2005) is an intriguing finding since it suggests a preceding brain damage of unclear aetiology.

Several factors have been associated with cognitive functions and seizures, factors include when the seizures started, how long they lasted, what medications were used, where the seizures were focused (in focal seizure), and whether or not the disease was focal or generalised (Jokeit & Ebner, 2002; Aldenkamp & Arends, 2004; Dodrill, 2004).

Neuropsychological examinations typically evaluate a person's cognitive abilities across five different areas; however, the diseased brain can cause these areas to become

disassociated from one another. These include reasoning, communication, storage, perception, and management. Each of these areas encompasses a wide range of abilities. For instance, memory tests can evaluate short-term memory (such as information learned during the testing session) and long-term memory (such as information remembered from one's life or information anticipated in the future). Understanding how to ride a bike is an example of procedural memory, which can be distinguished from declarative memory, (which includes both remembering events one by one (the recall of memories and episodes) and specifically, semantic recollection (knowledge of the world). All of these skills have been demonstrated to become dissociated in people with localised lesions. This view is shared by others (Helmstaedter, 2008).

Literature has shown that cognitive decline is a concern among individuals diagnosed with seizure disorder (Ogunrin et al, 2010). Several factors that have been associated with this decline include: duration of the onset of the illness before commencing treatment, seizure frequency, and medication. The nature, characteristics, course and effects of these trends is of growing interest among newly diagnosed children with seizure disorder. This observed decline has effects that have also been associated with it including: increasing dropout rate from school rated as higher than within the normals (27% vs 7%), low self-esteem, poor interpersonal relationship, and the development of psychiatric co-morbidity (Akinsulore & Adewuya, 2010). It is noteworthy that such effects on these children can have adverse consequences on the patient, thus the capacity to adequate skills for survival becomes compromised, and possibilities of ending up as burden to caregivers increases. Moreover, reports about the extent of the variance that the individual, social, and clinical factors contribute to this decline are conflictual; one wonders perhaps if there might be cultural influences on these findings. If the extent of these cognitive functioning is known and associated psychosocial and clinical factors are described, then a rehabilitation program specifically tailored to address them can be done to help improve the quality of life and skill development among these children and adolescents. This study intends to identify and investigate, over a 6 -month period, the psychosocial predictors associated with changes in the cognitive functioning of children and adolescents who are newly diagnosed with seizure disorder at the Child and Adolescent clinic of the Federal Neuro psychiatric hospital, Yaba, Lagos, Nigeria.

1- Drug type will significantly influence cognitive functioning from first observation to six months follow- up observation among children newly diagnosed with seizure disorder.
2- Age, perceived stigmatization, self-esteem, and perceived discrimination will be significantly correlated with decline in level of cognitive functioning among children newly diagnosed with seizure disorder.
3- Psychosocial factors will be significantly more influential in cognitive outcome than clinical factors among children newly diagnosed with seizure disorder.

METHOD

Research design

Descriptive survey design guided this study. This design is indicated in order to find out the trend of cognitive functioning among the participants. All the participants were assessed

Research setting.

The study was carried out at the Child and Adolescent Mental Health Centre of the Federal Neuropsychiatric hospital Yaba, Lagos. The Centre was commissioned as a specialist mental health facility for children and adolescents in 2003. It has facilities for both in and out patients' mental health services. The services offered include developmental and clinical psychology; child

psychiatry; child social work; occupational therapy; physiotherapy; educational therapy and pharmacy. There are two clinical psychologists and one Child developmental psychologist who provide psychological evaluation and psychotherapy. The assessment rooms were conducive and amiable, free of distraction, properly ventilated and restricted to unauthorized entry. There are four clinic days in each week. An average of twelve new patients is seen in the general children clinic on clinic days (usually made up of neurological and behavioral conditions). An average of one (1) patient per clinic day met the inclusion criteria for this study.

Study participants

Participants for the study were purposely selected from the outpatient clinic of the Child and Adolescent Centre on their various clinic days. They were identified from the appointment registers with the assistance of the record personnel who are the custodians of the registers. Thus, all the participants who met the inclusion criteria between September and December 2016 were recruited into the study.

For this study, 38(59.4%) of the participants were male, while 26(40.6%) were female. As regards age, 9(14.1%) belong to age bracket of 5-9 years, 24(37.5%) fall between the age range of 10-13 years and 31(48.4%) were within the age bracket of 14 – 16 years. Also, 43% of the participants received a diagnosis of complex partial seizure, while 42% were diagnosed with simple partial seizure, the remaining 15% were diagnosed with generalized onset seizure. In addition, 57% of the patient were placed on carbamazepine while the remaining were on sodium valproate.

Inclusion criteria: the participant must

(a) Be newly clinically diagnosed with seizure disorder by a consultant psychiatrist
(b) Has not used any anti-epileptic medication in the past
(c) Be between the age six and sixteen
(d) Parent/caregiver give consent for the participant to partake in the study
(e) Accent from the participant
(f) Parent/caregiver sign consent form

Exclusion criteria: the participants must

(a) Not have a co morbid psychiatric illness, mental sub-normality or progressive neurological disorder
(b) Not have visual or auditory impairment
(c) Not have been using any known anti- epileptic medication

Ethical consideration:

Ethical approval to carry out this study was obtained from the Research and ethical standards committee of the FNPHY.

Instruments

Data collection and observations in this study were made with the aid of valid questionnaire and assessment instruments. The questionnaire was divided into four sections:

Section A: This section consisted of demographic data to obtain personal information about the participant such as age, gender, duration of seizure, seizure type, medication etc.

Section B: **Piers-Harris Children's self – concept scale, second edition (Piers & Harris, 2002)**. This scale is the children version of the Washington Psychosocial Seizure Scale and is clinically relevant instruments for identifying sources of distress, usual resilience strategies, and preventative measures among children with seizures. It is composed of sixty items covering six psychosocial domains: Physical appearance; perceived discrimination; perceived stigma;

freedom from anxiety; learning (intellectual/school) status; behavioural adjustment; happiness and satisfaction; and popularity. It has a reliability coefficient alpha of r= 0.73. The participant indicated whether each item applies to them by selecting a yes or no response based on the child's own perception rather than the observation of parents or teachers.

Section C: This section is made up of tests that assessed the cognitive functions of the participants. The test assessed four areas including attention, concentration, memory, and processing speed. The test contained a total of twenty- four items made up of six items in each of the four areas. The author obtained a reliability co efficient alpha of r = 0.82 for this test. Each participant responded accordingly to the items: for attention each participant was required to repeat 2 – 7 digits forward after the examiner has called them out; for concentration the participant was required to repeat 2 – 7 digits in reverse order after the examiner has called them out; for memory, the participant was expected to re arrange six series of mixed numbers and letters with the letters coming first, while for processing speed the child was presented with six rows of items. One or two symbols were present on the left side of the row. A number of symbols are located on the right side of the row. The task requires the child to expeditiously ascertain whether the symbol on the left, or either of the two representations, was also present among the designs displayed on the right. This test is a measure of speed and accuracy with which the child paid attention, concentrated, recalled and processed information. Scores were generated for each of the domains and a Total Composite score of cognitive function was generated. The Total Composite score represents the cognitive functioning of each participant. Each participant obtained a composite score in this section. The test was administered in a room free of distraction and noise.

Section D: **Sony digital stop watch.** This is a digital watch and clock with six digit LCD and three operation buttons. Measurement ranges: minutes, seconds,1/100 second and hour/ minute/ second. Resolution: 1/100 secs to 1 sec. display; 59 mins, 59 secs, 99 1/100 secs. 23 h 59m 59s

Procedure

The study was carried out in two stages: the pilot stage and the main study.

Pilot Study: a pilot study was conducted at the Child and adolescent Centre of the FNPHY, Oshodi, Lagos state in order to have a pre- knowledge of the logistics involved in carrying out such study among the population. It also served to enable the re- validation of the scales to be used in the main study for psychometric and cultural (language) relativity. At this stage the scales were exposed to 11 participants.

The main study

a- This involved the administration of the questionnaires to the participants at
i) Baseline
ii) 3 months after baseline
iii) 6 months after baseline

Every new patient who obtained a diagnosis of seizure disorder and who met the other inclusion criteria was recruited into the study. They were exposed to the tests and the observation recorded. Each participant was exposed to all the levels of observation. Similarly, all the requirements for each observation were similar to each other and were met at each level. Participants were recruited before commencing specific anti – epileptic drug therapy and therefore drug naïve before testing. Cognitive testing was done only if the patient was seizure free for at least one week before testing.

Each of the observations was compared to the Baseline at the third and sixth month, to identify the profile of cognitive function among the participants

Control of Extraneous variable

1- Each of the participants served as control unto itself as multiple observations was carried out within the same participants at different interval within a time frame. All participants received similar treatment across each observation.

2- The observations were made by the same personnel to minimize experimenter bias.

3- Avoidance of Intrusion: the observations were done in a quiet and conducive room free from distraction of noise, heat and unauthorized entry. The cooperation of other members of staff was also obtained in order to reduce other distraction.

Statistical analysis

SPSS version 18.0 was used to look at the data. Descriptive statistics and regression analysis were used. Mean scores and standard deviations were computed to determine the relative scores of the different observations. The independent t-test and ANOVA were computed to compare the scores of the observations respectively. Pearson Product-moment statistics was calculated to find the relationship between the variable.

RESULTS

This chapter deals with data analysis and interpretation of the findings. Specifically, the study provided answers to the research hypotheses. Analysis of variance (ANOVA), Hierarchical regression analysis for testing composite relationship of the independent variables and t-test for independent sample were used.

Table 1: Cognitive function scores (average composite scores)

Variable	1st		2nd		3rd	
	Carb	Na	carb	Na	Carb	Na
Attention	9.5	10.4	8.5	8.4	9.5	8.6
Concentration	8.5	9.3	8.0	8.5	8.0	8.6
Memory	7.5	7.9	7.0	7.1	6.5	7.1
Processing speed	10.5	11.9	9.0	10.4	8.5	10.4
Total composite	36.04	39.5	33.2	34.4	32.3	34.7

Table 1 shows the average composite scores obtained by the participants on the cognitive functioning (attention, concentration, memory and processing speed), medicine (carbamazepine and sodium valproate) observed on three different observations (first, second, and third). It shows the decline in cognitive functioning over time and the effects of medication

Level of change in cognitive function

The first hypothesis stated that drug type would significantly influence cognitive functioning from first observation to three months follow-up observation among children.

Table 2 Summary of 2x3 ANOVA showing the influence of drug type and observation on cognitive functioning.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Observations	3711.210	2	1855.605	21.449	<.01
Medicine	3306.967	1	3306.967	38.225	<.01
Observations * Medicine	602.210	2	301.105	3.480	<.05
Error	16091.495	186	86.513		
Corrected Total	23241.745	191			

The result of analysis of variance shows that there was significant main effect of medicine on cognitive functioning (F (1,186) =38.23, p<.01). There was also significant main effect of observation on cognitive functioning (F (2,186) = 21.45, p<.01). Furthermore, the result also revealed that there was significant interaction between observations and medicine on cognitive functioning (F= (2,186) = 3.48, p<.05). The stated hypothesis is therefore accepted.

Psychosocial correlates of cognitive changes

The second hypothesis stated that age, perceived stigmatization, self-esteem, and perceived discrimination will be significantly correlated with decline in level of cognitive functioning among children with epilepsy. Pearson Product Moment Correlation was used to test this hypothesis, and the results are shown in Table 3.

Table 3: Zero-order correlation showing the relationship between age, perceived stigmatization self-esteem perceived discrimination and cognitive functioning.

Variables	Mean	SD	1	2	3	4	5
1. Cognitive functioning	105.81	18.85	-				
2. Age	9.61	2.49	.38**	-			
3.Perceived stigmatization	4.77	2.28	.43**	.86**	-		
4. Self-esteem	6.30	2.56	.33**	.74**	.89**	-	
5.Perceived discrimination	6.08	2.13	.59**	.85**	.80*	.64**	-

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Table 3 reveal that there was significant positive relationship between age (r = .38, p<.01), perceived stigmatization (r = .43, p<.01), self-esteem (r = .33, p<.01), perceived discrimination (r = .59, p<.01) and cognitive functioning. The result indicates that increase relate to decrease in cognitive functioning. The hypothesis is thus accepted.

seizure related and psychosocial predictors of changes in cognitive function

The third hypothesis stated that psychosocial factors will be significantly more influential in cognitive outcome than clinical factors among children newly diagnosed with seizure disorder. The hypothesis was tested with hierarchical progression and the results are presented in Table 4

Table 4: Hierarchical regression analysis showing the influence of psychosocial factors (Perceived discrimination, Self-esteem, Perceived stigmatization) and clinical factors (type of seizure, onset of seizure and frequency of seizure) on cognitive functioning.

	Model I		Model II	
Predictors	B	T	β	T
Perceived discrimination	.668	3.724	.918	4.278
Self esteem	-.023	-.098	.020	.087
Perceived stigma	-.082	-.276	.126	.414
Type of seizure			-.037	-.339
Onset			-.525	-2.169
Seizure frequency			-.019	-.173
R	***0.591[a]***		***0.638[b]***	
R^2	***0.350***		***0.407***	
Δ R^2	***0.317***		***0.345***	
Df	***3,60***		***6,57***	
F	***10.76***		***6.52***	

Statistical Value significant at the 0.01 level (2-tailed).
Statistical Value significant at the 0.05 level (2-tailed).

Table 4 revealed that Perceived discrimination, Self-esteem, Perceived stigmatization significantly predicted cognitive functioning among children with epilepsy (R^2= 0.35, ΔR^2 = 0.32, F = 10.76, df = 3, 60, *p*<.01). Perceived discrimination, Self-esteem, and Perceived stigmatization were found to significantly predict 35% of variance observed in the cognitive functioning reported among children with epilepsy. The result further revealed that perceived discrimination (β = .67, t= 3.72, p<.01) have significant independent influence on cognitive functioning among children with epilepsy. This implies that children with high perceived discrimination were more likely to have higher decline in cognitive functioning than those with low perceived discrimination.

The result revealed that the addition of present epilepsy factors (type of seizure, onset of seizure and frequency of seizure) contributed significantly to the change observed in the prediction of cognitive functioning (R^2= 0.41, ΔR^2 = 0.34, F = 6.52, df =6,57, p<.01). Perceived discrimination (β = .92, t= 4.28, p<.01) and onset of seizure (β = -.53, t= -2.17, p<.01) remained significant independent predictors of cognitive functioning, while the influence of self-esteem, Perceived stigmatization, type of seizure and frequency of seizure were negligible in the model. The hypothesis is thus partially accepted

Table 5: Hierarchical regression analysis showing type of seizure, seizure frequency and perceived discrimination moderating the effect of drug type on cognitive functioning

	Model I		Model II	
Predictors	B	t	β	T
Type of seizure	-.114	-.945	-.066	-.281
Seizure frequency	-.114	-.908	.212	.853
Perceived stigmatization	.410	3.425	-.075	-.497
Medicine *Perceived discrimination			.822	4.420
Medicine*tp			-.071	-.230
Medicine *frequency			-.391	-1.294
R	***0.453[a]***		***0.656[b]***	
R^2	***0.205***		***0.430***	
Δ R^2	***0.165***		***0.370***	
Df	***3,60***		***6,57***	
F	***5.15***		***7.17***	

***Statistical Value significant at the 0.01 level (2-tailed).**
***Statistical Value significant at the 0.05 level (2-tailed).**

The result above, revealed that relationship between medicine and perceived discrimination was predicted and moderated by perceived stigmatization (R^2 = *.21, F= 5.15, p<.01)*, the interaction between medicine and perceived discrimination was significant (β= .82, t=4.42, p<.01). This suggests that perceived stigmatization moderated the relationship between medicine and perceived discrimination. The result indicates that children with high perceived stigmatization significantly reported higher reduction in cognitive functioning.

Table 6: Summary of 2-way ANOVA for repeated measures showing the effect of medicine on cognitive functioning

Source	Sum of Squares	Df	Mean Square	F	Sig.	Wilks' Lambda	η^2
			Between Subjects				
Medicine	256.691	1	256.691	2.210	.142	0.641	.969
Error	7202.559	62	116.170				
			Within Subjects				
Medicine	140.391	1	140.391	23.092	.000	0.641	.271
Observations * Medicine	29.975	1	29.975	4.930	.030	0.914	.074
Error (Observations)	376.932	62	6.080				

The result revealed that Mauchly's test indicated that the assumption of sphericity had been violated, $\chi 2\ (2) = 49.12$, $p = .447$, therefore degrees of freedom were corrected using Greenhouse – Geisser estimates of sphericity (ε=.64). There was no substantial main effect for time, Wilks Lambda = 0.64, F (1, 62) = 2.21, $p > .05$, partial eta squared = .03, where the first observation showed an increase in cognitive functioning scores while the second and third observations-maintained balance. The main effect comparing the medicine was significant, Wilks Lambda = .641, F (1, 62) = 23.09, $p = .001$, partial eta squared = .27, suggesting difference exist between the medicine scores on cognitive functioning, across three-time observations (First observation, second observation and 3-month follow-up observation). There was significant interaction between observation and medicine, Wilks Lambda = .91, F (1, 62) = 4.93, $p < .001$, partial eta squared = .66.

Table 7: Descriptive Statistics showing the mean difference of observations and medicine on cognitive functioning

	Medicine	Mean	Std. Deviation	N
First observation	Carbamazepine	36.0400	8.34406	25
	Na	39.5128	7.43347	39
	Total	38.1563	7.92268	64
Second observation	Carbamazepine	33.1600	6.10792	25
	Na	34.3846	6.96085	39
	Total	33.9063	6.61820	64
Third observation	Carbamazepine	32.2800	5.54917	25
	Na	34.6923	6.06176	39
	Total	33.7500	5.94151	64

The result of the cognitive functioning scores for children exposed to carbamazepine decreased from the first observation to the third observation. The cognitive functioning scores for children exposed to Sodium Valproate showed a significant change from the first observation (M = 39.51) to the second observation (M = 34.38) and 6 months follow-up observation (M = 34.69), while the change in the second and third observation was not significant. The change in scores of the first observation was greater in those who were treated with carbamazepine in the second and third observation than those treated with Sodium Valproate.

Table 8: Post hoc analysis showing the difference in cognitive functioning at first, second and third observations.

Observation	Mean	Std. Error	Multiple comparison test		
			1	2	3
First	37.776	.999		**4.004***	**-286**
Second	33.772	.851			**-4.290***
Third	33.486	.752			

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

Post hoc analysis looking at the effects of medicine within the observation period. The result shows that there was significant difference in the cognitive functioning of children with epilepsy from the first observation to the third observation, indicating that at the first observation (M= 37.78) there was significant decrease in cognitive functioning compare to the second (M= 33.77) and third observation (M= 33.49).

Table 9: Interaction between Medicine and Observations on cognitive functioning

Medicine	Observation	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Carbamazepine	First	36.040	1.560	32.922	39.158
	Second	33.160	1.329	30.504	35.816
	Third	32.280	1.174	29.934	34.626
Na	First	39.513	1.249	37.017	42.009
	Second	34.385	1.064	32.258	36.511
	Third	34.692	.940	32.814	36.571

The result of the cognitive functioning scores for children exposed to carbamazepine decreased from the first observation to the third observation. The cognitive functioning scores for children exposed to Sodium valproate showed a significant change from the first observation (*M* = 39.51) to the second observation (*M* = 34.38) and 6 months follow-up observation (*M* = 34.69), while the change in the second and third observation was not significant. The change in scores of the first observation was greater in carbamazepine in the second and third observation than in Sodium Valproate

DISCUSSION

This study was carried out to explore the psychosocial and seizure related variables that predict cognitive dysfunction among newly clinically diagnosed children and adolescents with seizure disorder attending a Lagos based clinic.

Drug Type and Cognitive Functioning

The study revealed that there was significant main effect of medicine cognitive functioning. As one of the major seizure related factors involved in the treatment of individuals diagnosed with seizure disorder, the results of this study revealed that the type of medication or drug prescribed

can predict changes in cognitive functioning among the population. Observation also had main effect on cognitive functioning. The results showed that over a period of six months that the participants were observed, significant changes were observed in their attention, concentration, memory and processing speed. Furthermore, the result also revealed that there was significant interaction between observations and medicine on cognitive functioning. The result is in line with study by Seidel and Mitchell, (1999) found that there are some positive effects of medication on cognition has it has It has been reported that the observed effects primarily involve a reduction in memory function. As demonstrated by a particular study, the capacity of children with benign Rolandic epilepsy to recall stories was diminished upon administration of carbamazepine. Bittencourt Antoniuk et al. (1993) discovered that adolescents and children exhibited decreased short-term, long-term, episode, and semantic recollection. Children diagnosed with complex partial epilepsy may experience a slight advantageous impact on their hand-eye coordination, alongside enhancements in their memory function. Helmstaedter and Witt (2010) discovered that controlled release medication may be particularly advantageous for memory and visual information processing. Although there are some positive results, the majority of research indicates that carbamazepine is more prone to causing cognitive decline rather than enhancement.

Psychosocial Correlates Of decline in Cognitive function

The result revealed that there was significant positive relationship between age, perceived stigmatization, self-esteem, perceived discrimination and cognitive functioning. The result indicates that increase in age, perceived stigmatization, self-esteem, and perceived discrimination significantly related to decrease in cognitive functioning. This is in line with study by Aydemir, Kaya, Yldztura and Baklan (2016) who found a positive relationship between drugs for epilepsy and perceived shame. Positive relationships between anti- epileptic drugs and prejudice were also found by Yeni, Tulek, Bebek, Dede, Gurses, Baykan, and Gokyigit (2016). On the other hand, Viteva (2011) discovered no connection between social shame and medical intervention. Iatrogenic effects of therapies may contribute to observed relationships. In multivariate regression analysis, adverse events and side effects associated to the usage of anti-epileptic medicines were observed to strongly predicted discrimination.

Influence Of Psychosocial and clinical factors in cognitive outcome

The result revealed that Perceived discrimination, Self-esteem, Perceived stigmatization significantly predicted cognitive functioning among children with epilepsy. Perceived discrimination, Self-esteem, Perceived stigmatization were found to significantly predict 35% of variance observed in the cognitive functioning reported among children with epilepsy. The result further revealed that perceived discrimination have significant independent influence on cognitive functioning among children with epilepsy. This implies that children with high perceived discrimination were more likely to have higher decline in cognitive functioning than those with low perceived discrimination. The result further revealed that the addition of present epilepsy factors revealed that type of seizure onset of seizure and frequency of seizure contributed significantly to the change observed in the prediction of cognitive functioning. Perceived discrimination, onset of seizure remained significant independent predictors of cognitive functioning, while the influence Self-esteem, Perceived stigmatization, type of seizure and frequency of seizure were negligible in the model.

More so, it was revealed that relationship between medicine and perceived discrimination was predicted and moderated by perceived stigmatization, the interaction between medicine and perceived discrimination was significant. This suggests that perceived stigmatization moderated the relationship between medicine and perceived discrimination. The result indicates that children with high perceived stigmatization significantly reported higher reduction in cognitive functioning.

The result revealed that the first observation showed an increase in cognitive functioning scores while the second and third observations-maintained balance. The main effect comparing the medicine was significant, suggesting difference exist between the medicine scores on cognitive functioning, across three-time observations (First observation, second observation and 3-month follow-up observation). There was significant interaction between observation and medicine.
The result of the cognitive functioning scores for children exposed to carbamazepine decreased from the first observation to the third observation. The cognitive functioning scores for children exposed to Sodium valproate showed a significant change from the first observation to the second observation and 6 months follow-up observation, while the change in the second and third observation was not significant. The change in scores of the first observation was greater in carbamazepine in the second and third observation than in Sodium Valproate. This result supported the study by Prevey, Delaney, Cramer, Cattanach, Collins, and Mattson (1996) who reported that there was no discernible decrease in the performance of tasks that evaluated coordination, memory, concentration, or mental flexibility. However, there was a lack of observable practise effects in the control group, which may suggest minimal alterations in cognitive function. Slight alterations in cognitive performance have been documented in geriatric individuals as well as in adult and paediatric populations. Nonetheless, Brouwer et al. (2002) reported that during the latter study, they observed slight unfavourable cognitive outcomes at the onset of treatment, which plausibly arose from seizure discharge. A different research study indicated the absence of a correlation between plasma concentration and cognitive abilities among children. According to a double-blind, placebo-controlled study, there is more compelling evidence of enhanced motor skills following cessation.. Furthermore, Sun Wang, Wang, & Wu, (2008); De Araujo, Filhou (2006); Meador, Loring, Hulihan, Kamin, & Karim, (2003). the CAEs associated with valproate are likely to be reversible. It has been said that valproate has a better effect on intellectual performance than antiepileptic drugs, benzodiazepines, and topiramate, which are all AEDs.

Conclusion

The study investigated role of psychosocial and seizure related factors in cognitive functioning changes among newly clinically diagnosed children and adolescents with seizure disorder in Lagos. Based on the results of the findings it was concluded from the study that there was also significant main effect of medicine on cognitive functioning; Furthermore, the result also revealed that there was significant interaction between observations and medicine on cognitive functioning. Significant positive relationship between age, perceived stigmatization, self-esteem, perceived discrimination and cognitive functioning was also revealed -thus, an increase in age, perceived stigmatization, and perceived discrimination significantly relate to decrease in cognitive functioning. Also, Perceived discrimination, Self-esteem, Perceived stigmatization significantly predicted cognitive functioning among children with epilepsy.
More so, it was revealed that relationship between medicine and perceived discrimination was predicted and moderated by perceived stigmatization, the interaction between medicine and perceived discrimination was significant. This suggests that perceived stigmatization moderated the relationship between medicine and perceived discrimination. The result indicates that children with high perceived stigmatization significantly reported higher reduction in cognitive functioning.

The result revealed that the first observation showed an increase in cognitive functioning scores while the second and third observations showed reduced scores on cognitive functioning. The main effect comparing the medicine was significant, suggesting difference exist between the medicine scores on cognitive functioning, across three-time observations (First observation, second observation and third observation). There was significant interaction between observation and medicine.

The result of the cognitive functioning scores for children exposed to carbamazepine decreased from the first observation to the third observation. The cognitive functioning scores for children exposed to Sodium Valproate showed a significant change from the first observation to the second observation and third observation as well, however the change in the second and third observation was not significant. The change in scores of the first observation was greater in those who were treated with carbamazepine in the second and third observation than those treated with Sodium Valproate. The result also shows that there was significant difference in the cognitive functioning of children with epilepsy from the first observation to the third observation, indicating that at the first observation there was significant decrease in cognitive functioning compare to the second and third observations.

The result of the cognitive functioning scores for children exposed to carbamazepine decreased from the first observation to the third observation. The cognitive functioning scores for children exposed to Sodium valproate showed a significant change from the first observation to the second observation and 6 months follow-up observation, while the change in the second and third observation was not significant. The change in scores of the first observation was greater in carbamazepine in the second and third observation than in Sodium valproate.

Children with epilepsy are more likely to experience a wide variety of cognitive impairments and to have significant intellectual disability, both of which can have a negative impact on their ability to succeed in school. Epilepsy-related factors, such as aetiology, underpinning psychopathology, method of testing seizures severity, and antiepileptic drug use, have all been associated to cognitive problems at or after the time of seizure identification (AEDs). Previously, seizure symptoms, longer duration of illness, continual convulsions, and pharmacological treatments all increase the importance of early identification, neurodevelopmental control, and adequate intervention for cognitive impairment in children. These are necessary to improve individualized healthcare therapies, reduce the likelihood of special schooling and interpersonal issues, and maintain academic success. In order to give a developmentally relevant treatment, an appropriate educational syllabus, occupational therapy, friendly workplace environment, and a comfortable workplace to promote independence across the life span in adolescents with convulsions, early and accurate identification of intellectual impairment is essential. Treating intellectual disability in younger people or reducing incidences of cognitive decline requires early and thorough seizure management and EEG stabilization. Careful titration, utilising the smallest possible dose of AEDs, avoiding pharmaceutical interventions, and addressing associated neuropsychological diseases are all ways to lessen the cognitive adverse effects of epilepsy drugs. Despite the risks, intellectual impairment in seizures must be handled first by reaching full or acceptable medical impact with AEDs.

Recommendations

This study shows that cognitive and psychosocial therapies are especially important for young people with epilepsy. Cognitive development problems, like trouble with language, start in early childhood and stay with the person for the rest of their life. Due to the detrimental effects on language function associated with epilepsy's early onset age, it is possible that the youngest children with the disorder might benefit the most from treatment. More adolescents than younger children suffer from speech and language difficulties. The current state of diagnostics is insufficient to determine the cause of cognitive decline. It's likely that in the future fMRI will be utilised to identify even the most minute of changes, allowing for early intervention to be carried out. People who took part in the study said they were interested in future treatments for epilepsy and in getting the word out about what the study found. Future therapies should be looked at to figure out the best ways to treat epilepsy in young adults.

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