

# **FAMILY FACTORS, SELF-ESTEEM AND PEER INVOLVEMENT AS PREDICTORS OF DYSCALCULIA AMONG STUDENTS WITH LEARNING DISABILITIES IN IKEJA, LAGOS STATE OF NIGERIA**

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## **ABSTRACT**

*This study investigated family factors, self-esteem and peer involvement as predictors of dyscalculia among students' with learning disabilities in Ikeja Lagos State Nigeria. Using the descriptive survey research design, three research questions were raised and three hypotheses were tested. Data were collected from three hundred secondary school students in SSS11 expressing dyscalculia with learning disabilities in Ikeja Local Government Area of Lagos State Nigeria using their cumulative cognitive score of three consecutive examination records and three validated instruments. Analysis of data was done using the multiple regression analysis and Pearson Product Moment Correlation (PPMC). The results revealed that self-esteem, peer-involvement and family factor made a joint contribution on dyscalculia among students' with learning disabilities. The findings also revealed that peer involvement has significant relationship with the problem of dyscalculia among students' with learning disabilities. However, self-esteem and family factor did not have significant relationship with the problem of dyscalculia among students' with learning disabilities. The findings have implications for the academic development and aspirations of students expressing dyscalculia with learning disabilities. Thus, it is recommended that they should be given considerable support, attention and care by family members, the society and significant as others as to give them sense of belonging and purpose in life. Through this measure, they could easily self-rediscover themselves, their potentials and ability to succeed in not only their academic task, but also in other life challenges.*

*Keywords: Dyscalculia, Learning Disabilities, Self-Esteem, peer involvement and Family Factors.*

## **INTRODUCTION**

In present day contemporary society, mastery of basic academic skills-reading, writing and arithmetic is a necessary pre-requisite for success in both school and employment setting and in society at large. This brings to bear the fact that most people would agree that a major goal of schooling should be the development of students' understanding of basic mathematical concepts and procedures. All students, including those with disabilities and those at risk of school failure, need to acquire the knowledge and skills that will enable them to “figure out” mathematics related problems that they encounter daily at home and in future work situations. Unfortunately, there is

considerable evidence to indicate that this objective is not being met, especially as a large percentage of children suffer from learning disabilities and therefore do not master or partially master-these required academic skills and the consequence is grave across their developmental lifespan. Consequently, the increasing trend of expressed learning disabilities among students in schools in Nigeria is quite disturbing.

The occurrence of this phenomenon is based on the premise that children and youth are faced with many challenges, including changing family constellations, negative peer influence, economic hardship, and exposure to violence, availability of drugs and alcohol, development of low self-esteem and a general lose of community bonds. Long term exposure to these risky conditions may have debilitating consequences (Maag, Irvin, Reid and Vasa, 1994), particularly if one must deal with them in addition to a learning disability. Learning disabilities signify inadequate development in specific area of academic, language, speech or motor skills. And they could result to expressed deficit in student's self-esteem, expressed helplessness and poor adjustment to teaching and learning situation in classroom. These more often than not, could have some negative impact not only on the well-being of these students, but also on significant others and society as it causes behavioural problems in students and frustration in other concern individuals. However, learning disability is not a problem with intelligence (Gardill, 1996).

Lerner (1995) posit that learning disabilities affect the manner in which individuals with normal or above normal intelligence take in, retain and express information. Individuals with learning disabilities also may have difficulty with sustained attention, time management or social skills. Also, the negative implication of dyscalculia on the educational development and academic success of students with learning disabilities cannot be overemphasized. Dyscalculia refers to a persistent difficulty in the learning or understanding of number concepts (for example  $4 > 5$ ), counting principles (for example, cardinality - that the last word tag, such as "four" stands for the number of counted objects), or arithmetic (for example, remembering that  $2 + 3 = "5"$ ). These difficulties are often called a mathematical disability (Gersten, Jordan and Flojo, 2005). It is of note that between 3 and 8% of school-aged children shows persistent grade-to-grade difficulties in learning some aspects of number concepts, counting, arithmetic, or in related mathematics areas (Badian, 1983). Thus, many children with dyscalculia have difficulties to remember basic arithmetic facts, such as the answers to  $5+3$ . It is not that these children do not remember any arithmetic facts, but that they cannot remember as many facts as other children do and appear to forget facts rather quickly (Jordan, Hanich and Kaplan, 2003).

Dyscalculia has also been identified in relation to school failure and school dropout (Wehlage, Rutter, Smith, Lesko, and Fernandez, 1989) and substance abuse (Hawkins, Catalano and Miller, 1992). For these outcomes, different factors come into play. Most children experience disturbed peer relationships; lack of parenting skills (Kolvin, Miller, Fleeting and Kolvin, 1988); parental psychopathology

(Hutchings and Mednick, 1974); chronic family discord and lack of social support for the child and the family (Sameroff and Seifer, 1990). The family environment has been identified as a key factor that can provide both risks (e.g., discord, inconsistent discipline) and protection (e.g., a supportive adult relationship, cohesive family functioning) for the developing child. Having a child with a learning disability may add to a family's stress in several ways. Problems with information processing may be evident at home as well as at school; thus, parents may experience different types of interactions with their children who have learning disabilities than with their children who do not have learning disabilities (Kaslow and Cooper, 1978). Parental expectations and disappointment with a Dyscalculia child's poor academic performance also increase family stress (Kaslow and Cooper, 1978).

Supporting this assertion, Aoife (2011) contends that much research shows that dyscalculia children who have learning disabilities are at risk for having lower self-esteem and self worth than that of their peers. Likewise, Mann, Hosman, Schaalma, and deVries (2004) affirms that self-esteem is analogous to self-regard, self-worth, and self-estimation. Thus, research supports a relationship between expressed low self-esteem and the learning experience of dyscalculia students with learning disabilities (Winfield and Tiggemann, 1985). Dyscalculia students with learning disabilities often experience low levels of self-esteem, perhaps with negative effect on their academic success (Wehmeyer, 1996). Understanding the relationship between self-esteem and the learning outcomes of dyscalculia students with learning disabilities may assist rehabilitation counsellors to develop interventions more effective at enhancing self-esteem, which should result in enhanced academic success outcomes for this group (Wehmeyer, 1996).

Likewise, Kunsch, Jitendra and Sood (2007) reports that the success of peer relation is realized when students working in pairs help one another learn material or practice an academic task. Thus, peer involvement works best when students of different ability levels work together. This practice gives both students the opportunity to better understand the material being studied. Research has also shown that a variety of peer-support programmes are effective in teaching mathematics, including Class wide Peer Tutoring (CWPT), Peer-Assisted Learning Strategies (PALS), and Reciprocal Peer Tutoring (RPT) (Barley, Lauer, Arens, Aphorpe, Englert, Snow and Akiba 2002). Successful peer-supporting approaches may involve the use of different materials, reward systems, and reinforcement procedures (Barley et al., 2002). There is also a mounting research evidence to suggest that, while low-achieving students may receive moderate benefits from peer involvement, effects for students specifically identified with LD may be less noticeable unless care is taken to pair these students with a more proficient peer who can model and guide learning objectives (Kunsch, Jitendra and Sood, 2007).

Dyscalculia characterizes one of the main challenges faced by students with learning disabilities in schools. These students do experience higher rate of failure due to their ability to learn and understand mathematical concept. Thus, Dyscalculia

impacts on students negatively in a myriad of ways. Many students expressing Dyscalculia with learning disabilities display low frustration tolerance, a tendency to become bored very easily or often, a lack of motivation for all but the most stimulating activities, and a relative inability to recognize future consequences of behaviour or to learn from mistakes. This development is as a result of their inability to experience success in the classroom. Based on this therefore, they perceive themselves as academic failures and as such, often develop a syndrome that includes a variety of self-defeating motives. For example, these students are far more apt to develop low levels of self-efficacy, low motivation, make negative self-statements, experience hopelessness and helplessness, resulting in poor academic performance.

This work is anchored on Self-Determination Theory (SDT) as proposed by Deci and Ryan (2008). Self-Determination Theory (SDT) represents a broad framework for the study of human motivation and personality. SDT articulates a meta-theory for framing motivational studies, a formal theory that defines intrinsic and varied extrinsic sources of motivation. The SDT framework thus has both broad and behaviour-specific implications for understanding practices and structures that enhance versus diminish need satisfaction and the full functioning that follows from it. When all of these needs are fulfilled, individuals experience improvements in wellbeing and satisfaction. Based on the trust of this context therefore, this study is wheeled on the principle of self-determination theory. Based on the above premise, the following research question and hypotheses are formulated:

1. Are there significant relationships among the independent and dependent variables?
2. What is the joint influence of the independent variables (family factors, self-esteem and peer involvement) on the dependent variable (dyscalculia among students' with learning disabilities)?
3. What is the relative contribution of each of the independent variables (family factors, self-esteem and peer involvement) on dyscalculia among students' with learning disabilities?

The following hypotheses will be tested at 0.05 level of significance

1. There is no significant relationship between self-esteem and dyscalculia among students' with learning disabilities
2. There is no significant relationship between peer involvement and dyscalculia among students' with learning disabilities
3. There is no significant relationship between family factors and dyscalculia among students' with learning disabilities

## **METHODOLOGY**

This study adopts a descriptive survey research method in which the researcher did not manipulate any of the variables. The participants for the study were all senior secondary school students (between ages 15-20yrs) (mean age: 17.5 years) in Ikeja,

Nigeria. A total of 300 participants were used for the study. This number comprises of thirty (60) students male and female purposively selected from five (5) schools in Ikeja North Local Government Area of Lagos State Nigeria amounting to a total of three hundred (300) students selected for the study.

The population of the study consists of three hundred senior secondary school students' in Ikeja Local Government Area of Lagos State, Nigeria. The participants for the study were SSS2 students at the verge of transiting to SSS3 in Ikeja local government area of Lagos State Nigeria. Five schools were used for the study. These schools were selected through simple box random sampling. Also, purposive sampling technique was used to select three hundred students (through evidence from their cognitive cumulative record folder of those) who had consistently scored below 30% in mathematics in SSS1 promotional examination and in both first and second term SSS2 mathematics examinations from five public schools.

Students Mathematics results: Evidence of dyscalculia was measured using the cognitive cumulative examination scores on Mathematics below 30% for three examinations (SSS1 promotional, SSS2 first and second term) of the students used for the study. Rosenberg's self-esteem scale (RSE) (1965) Self-esteem was measured using the researchers modified version of Rosenberg's self-esteem scale. The modified 10-item self-report scale requires respondents to indicate their perceptions of themselves in positive or negative ways. Examples of items in the scale include are: "I am able to do most mathematics exercises as well as most other people do" and "I can do any mathematical task I really set my mind to". Learners respond on a 4-point scale (4 = strongly agree, 3 = agree, 2 = disagree and 1 = strongly disagree) with higher total scores indicating a stronger self-esteem. The scale was revalidated through a pilot study using a test-retest method with a reliability coefficient of 0.77. However, the original scale has a reliability range of 0.85 to 0.88. Furstenberg and Cherlin (1991) family factor standardized scale was used to measure the influence of family factor in this study. It has an internal consistency reliability of .96. Dekovic and Meeus (1997) Peer Involvement standardized scale was used to measure the pattern of peer involvement in this study. It has an internal consistency reliability of .82.

The researcher first visited the randomly selected schools to intimate them of the research and solicited the support of the mathematics teachers to help identify students with consistent cognitive record performance of below 30% in three examinations. Thereafter, the researchers seek their consent and willingness to participate. After getting them informed and attaining their consent, the researcher personally distributed and collected the completed questionnaires administered to the students. Participants were adequately informed of the adherence to confidentiality and the need to be precise and truthful in filling the questionnaires. Three hundred copies of questionnaire were administered and collected back by the researchers. Data was analyzed using Pearson product moment correlation and multiple regression analysis statistical tools at 0.05 level of significance. Multiple regression was used to find out the combined and relative contributions of the independent variables on

dyscalculia among students' with learning disabilities. PPMC was used to determine if the level of relationship between the variables were statistically significant to warrant rejection or acceptance of the hypothesis. The results of the findings are presented on tables.

## RESULTS AND DISCUSSION

**Table 1:** Descriptive Statistics and Correlation Matrix of Relationship between Dyscalculia among Students' with learning Disabilities (Dependent) and Family Factor, Self-Esteem and Peer-Involvement (Independent) variables.

Variables	N	Mean	Std. Dev	1	2	3	4
Dyscalculia among Students' with learning Disabilities	300	49.83	10.26	1.000			
Self-Esteem	300	29.31	4.734	.069	1.000		
Peer-Involvement	300	47.25	9.131	.357	.078	1.000	
Family Factor	300	40.88	7.637	-.060	.105	.077	1.000

Table 1 gives description of measures of association between the variables identified in this study. The scores indicate that there is significant relationship between the variables (self-esteem, peer involvement and family factor). One striking outcome of the inter-correlation results is that peer involvement correlated most positively with dyscalculia among students' with learning disabilities.

**Table 2:** Regression summary showing the joint influence of the independent variables on dyscalculia among students' with learning disabilities.

R= .371

R<sup>2</sup>= .138

Adj R<sup>2</sup>= .125

Std Error= 9.5976

Source	Df	Sum squares (ss)	Mean square	F-Ratio	Sig
Regression	3	2887.981	962.660	10.451	.000
Residual	296	18054.239	92.113		
Total	299	20942.220			

The result on table 2 reveals that the three independent variables made a joint contribution of 13% to the prediction of dyscalculia among students' with learning disabilities. The composite effect of the independent variables as jointly contributive to dyscalculia among Students' with learning Disabilities are revealed on Table 2. The result of the multiple regression analysis produced an F-ratio ( $F_{296} = 10.451$ ) which was significant at  $p < 0.05$  alpha level.

**Table 3:** Relative Contribution of the independent variables on dyscalculia among students' with learning disabilities

Variables	B	Std. Error	Beta	t	Sig
	32.561	6.123	5.318	.002	
Self-Esteem	.109	.145	.050	.755	.451
Peer-Involvement	.405	.075	.361	5.408	.000
Family Factor	-.124	.090	-.092	-1.384	.168

Table 3 highlights the relative contribution of each of the independent variables on the dependent variable. The table reveals the magnitude of each independent variable contribution on the dependent variable. Thus, table 3 shows that peer involvement had more impact on dyscalculia among Students' with learning disabilities than self-esteem and family factor. The t-observ for each of the variables attest to this fact.

**Table 4:** PPMC summary showing relationship between self-esteem and dyscalculia among students with learning disabilities.

Variables	N	Mean	SD	R	Df	P
dyscalculia among Students' with learning Disabilities	300	49.83	10.26	.069	298	Sig
Self-Esteem	300	29.31	4.734			

Table 4 shows that self-esteem did not correlate with problem of dyscalculia among students' with learning disabilities. With this result the null hypothesis that there is no significant relationship between self-esteem and dyscalculia among students' with learning disabilities is thus accepted. This implies that the self-esteem do not have grave influence on the experience of dyscalculia among students' with learning disabilities.

**Table 5:** PPMC summary table showing significant relationship between peer involvement and dyscalculia among students' with learning disabilities.

Variables	N	Mean	SD	R	Df	P
dyscalculia among Students' with learning Disabilities	300	49.83	10.26	.357	298	Sig
Peer involvement	300	47.25	9.131			

Table 5 shows that peer involvement correlates significantly with the problem of dyscalculia among students' with learning disabilities. With this result the null hypothesis that there is no significant relationship between peer involvement and dyscalculia among students' with learning disabilities is thus rejected. This implies that the peer involvement impact greatly on the problems of dyscalculia among students' with learning disabilities.

**Table 6:** PPMC Summary showing significant relationship between family factor and dyscalculia among Students' with learning Disabilities.

Variables	N	Mean	SD	R	Df	P
dyscalculia among Students' with learning Disabilities	300	49.83	10.26	-.060	298	Sig
Family factor	300	40.88	7.6367			

Table 6 shows that family factor did not correlate significantly with the problem of dyscalculia among students' with learning disabilities. With this result the null hypothesis that there is no significant relationship between family factor and dyscalculia among students' with learning disabilities is accepted. This implies that the family factor do not have grave influence on the experience of dyscalculia among students' with learning disabilities.

The study indicates that there are relationships among the variables (self-

esteem, peer involvement and family factor) and the problem of dyscalculia among students' with learning disabilities. The possible reason for this could be that self-esteem, peer involvement and family factors are distinct variables which interplay impact on the cognitive, emotional, social and psychological stability and well-being of students. And it is only when a satisfied state is attained that students expressing dyscalculia with learning disabilities could attain positive academic achievement in school. This supports the expressed fact that dyscalculia has also been identified in relation to school failure and school dropout (Wehlage, Rutter, Smith, Lesko and Fernandez, 1989), and substance abuse (Hawkins, Catalano and Miller, 1992). For these outcomes, different factors come into play. Most children experience disturbed peer relationships; lack of parenting skills (Kolvin, Miller, Fleeting and Kolvin, 1988); parental psychopathology (Hutchings and Mednick, 1974); chronic family discord and lack of social support for the child and the family (Sameroff and Seifer, 1990).

The study further reveals that the three independent variables made a joint contribution of 13% to the prediction of the problem of dyscalculia among Students' with learning Disabilities. The reason for this could be adjudged to the fact that these factors have implication either positively or negatively on the mathematics ability and competence of students in school. Thus, these factors could implicitly stimulate in students the desire to attain success in their academic pursuit. The result could further be explained in line with the fact that most people would agree that a major goal of schooling should be the development of students' understanding of basic mathematical concepts and procedures. All students, including those with disabilities and those at risk of school failure, need to acquire the knowledge and skills that will enable them to "figure out" mathematics related problems that they encounter daily at home and in future work situations. This gives credence to the fact that learning disability is not a problem with intelligence (Gardill, 1996).

In addition, the study reveals that the independent variables relatively contributed in different magnitude to the problem of dyscalculia among Students' with learning Disabilities with peer influence having more impact than self-esteem and family factor. The reason for this could be adjudged to the fact that peers are significant to the character formation of students who in the quest for identity depend so much on the input of friends than family members in most cases. Again, considering the fact that adolescents spend most of their time with friends, they could be more influenced in that state. In support of this point of view, is the premise that children and youth are faced with many challenges, including changing family constellations, negative peer influence, economic hardship, and exposure to violence, availability of drugs and alcohol, development of low self-esteem and a general loosening of community bonds. Long term exposure to these risk conditions may have debilitating consequences (Maag, Irvin, Reid and Vasa, 1994), particularly on individuals expressing learning disability.

The study reveals that self-esteem did not correlate significantly with



dyscalculia among students' with learning disabilities. This implies that the self-esteem of students' expressing dyscalculia with learning disabilities did not determine to a great extent their academic achievement. Supporting this assertion, Aoife (2011) contends that much research shows that dyscalculia children who have learning disabilities are at risk for having lower self-esteem and self worth than that of their peers. Mann, Hosman, Schaalma and DeVries (2004) affirm that self-esteem is analogous to self-regard, self-worth, and self-estimation. Thus, research supports a relationship between expressed low self-esteem and the learning experience of dyscalculia students with learning disabilities (Winfield and Tiggemann, 1985). Dyscalculia students with learning disabilities often experience low levels of self-esteem, perhaps with negative effect on their academic success (Wehmeyer, 1996).

The findings show that peer involvement positively and significantly correlates with the problem of dyscalculia among students' with learning disabilities. This implies that peer involvement impact greatly on the problem of dyscalculia among students' with learning disabilities. This further suggests the fact that the possible show of solidarity, advice, expressed care and share show of concern often exhibited by students to their friends have great and immeasurable implication on them and equally influence their academic achievement. Supporting this point of view, Kunsch, Jitendra and Sood (2007) report that the success of peer relations is realized when students working in pairs help each other to learn material or practice an academic task. Thus, peer involvement works best when students of different ability levels work together.

The findings revealed that the influence of the family as a factor did not significantly correlate with the problem of dyscalculia among students' with learning disabilities. This implies that family factor does not impact greatly on the academic achievement of dyscalculia students' with learning disabilities. The reason for this might not be farfetched considering the present day family system and structures. As noted in Nigerian society and the world over, most families are either broken, not intact or they co-habit. Based on this challenging development, students might not appreciate the relevance of the family as cogent in their academic success. In congruence, the family environment has been identified as a key factor that could provide both risks (for example, discord, inconsistent discipline) and protection (such as a supportive adult relationship, cohesive family functioning) for the developing child (Kaslow and Cooper, 1978).

## CONCLUSION

Interestingly, dyscalculia students with learning disabilities are exposed to same challenges in classrooms, family environment and the larger society as other children. However, their experiences, combined with significant stressors in the family, school and community, put them at greater risk for negative emotional, familial, psychological, cognitive and developmental outcomes across their lifespan. Therefore,

for these sets of students to function at an expected contributive capacity towards self and societal growth and development, identification of their needs, challenges and desired aspiration is of paramount significance to their person and society at large. Thus, dyscalculia students with learning disabilities should be given considerable support, attention and care by family members, the society and significant others as to give them sense of belonging and purpose in life. Through this measure, they could easily self-rediscover themselves, potentials and ability to succeed in not only their academic task, but also in other life challenges. Also, the school should make learning interesting and enterprising as to motivate dyscalculia students with learning disabilities develop academic culture that would be self-inspiring, creative and purposefully oriented to sustain their desire to learn in school. Through appropriate information and counselling support services, dyscalculia students with learning disabilities could be made to positively appraise their challenges and appreciate their developmental nature.

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