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## Review Article

### EMOTIONAL ANGUISH: PSEUDO-DYSCALCULIA

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#### ABSTRACT

Dyscalculia is hidden difficulties that affect many individuals who usually have average or above average intelligence, but are unable to achieve at their potential. It is a brain-based condition that makes it hard to make sense of numbers and math concepts. Individuals with dyscalculia learn maths, but they learn very slowly. They need to be taught in a way that makes it possible for them to use their abilities to compensate for their weaknesses. One of the serious consequences of dyscalculia is that children who suffer from them do poorly in school unless they are helped. The children with dyscalculia experience emotional problems also. They have conflicts in their learning conditions which makes them emotionally problematic. *Pseudo-dyscalculia* is a big and important group in which learning difficulties arise from emotional blockings. The purpose of this article is to review research regarding each of these types of interactions and to draw implications for children who may have pseudo-dyscalculia i.e. emotional functioning and learning disabilities in mathematics.

## INTRODUCTION

In today's high-tech, increasingly connected world, it is vital that students build confidence in their ability to do mathematics, as deficiencies in this area can be a major impediment to many facets of life. Dyscalculia is a learning disability that affects learner's ability to read and to comprehend mathematics language. This also affects other aspects of student's lives, including their scientific and mathematical abilities. Hence, dyscalculia is an impair ability to learn basic mathematics. It is one of the most crucial problems of learning mathematics in schools. In other words, dyscalculia is the prevalent emotional, psychological, physiological and sociological problems associated with sciences and mathematics learning (Israel and Olubunmi, 2014). Emotions role in each and every student is as important as life itself. Life would be drab without emotions. Emotions enable students to think and behave adaptively with the environment. The term 'emotion' refers to the feeling and its distinctive thoughts, psychological and biological states and range of propensities to act (Goleman, 1996). The emotion is important within inter-personal relations and the individual development of students. It also related to the environment which students grow up in. On maturing, the same individual can adjust it to their own inquiries and needs.

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Dyscalculia is the manifestation of vague and unpleasant emotion experienced in a learner which interferes with the manipulation of numbers and solving of sciences and mathematics problems. Many students who suffer from dyscalculia have little confidence in their ability to study mathematics. Dyscalculia students have been attributed to the feeling of tension, helplessness, mental disorganisation, and dread one has when required to manipulates numbers and shapes and solving of scientific and mathematical problems (Ashcraft and Faust, 1994). Hence emotion plays a significant role in dyscalculic learners.

### Dyscalculia

The term 'dyscalculia' was first used by Josef Gerstman during the 1940s. In 1974, Ladislav Kosc conducted the first study on students and his research showed that dyscalculia is a structural disorder of mathematic abilities (Campbell, 2005). There is wide spread debate surrounding the true nature of dyscalculia, which makes it difficult to diagnose and challenging to determine its prevalence (Cowen, 2010). Dyscalculia was first discovered in 1919 by Salomon Henschen. He found that it was possible for a student to have impaired mathematical abilities that did not affect intelligence in general. Henschen referred to this learning disability as 'number blindness' (Campbell, 2005). It is important to be aware that dyscalculia is a broad term that includes many different kinds of difficulties in learning mathematics. Dyscalculia is sometimes called number blindness.

It is the name given to the condition that affects one's ability to acquire mathematical skills (Butterworth, 2003). The complexity of numerical processing has made it challenging to define what it means to have a specific mathematical disability. Traditional definitions state that the student must substantially underachieve on a standardised test relative to the level expected of a given age, education and intelligence, and must experience disruption to academic achievement or daily living (Butterworth, 2003). Dyscalculia primarily affects the learning process in relation to Mathematics. This can lead to anxiety and low self-esteem. Dyscalculia is a brain-based condition that makes it hard to make sense of numbers and math concepts. Some students with dyscalculia can't grasp basic number concepts. They work hard to learn and memorize basic number facts. They may know what to do in math class but don't understand why they're doing it. In other words, they miss the logic behind it. Other students understand the logic behind the math but aren't sure how and when to apply their knowledge to solving problems (Adler, 2001).

### Emotional aspects of learning disabilities

Abrams (1986) stated, "the vast majority of students with learning disabilities have some emotional problem associated with the learning difficulty". Traditionally, however, educators have placed priority on the diagnosis and remediation of learning disabilities (Hiebert, Wong, and Hunter, 1982). As mainstreaming and inclusion become increasingly pervasive, it is especially important for all teachers, parents to understand the interaction of emotional concerns and learning disabilities and the impact of that interaction on students functioning. Indeed, Sabornie (1994) suggested, "educators' lack of concern for social-affective problems among pupils is analogous to educational neglect". Students use their emotions effectively in order to think and solve problems at school. Students with emotional intelligence can precisely identify the feelings of themselves and others, which in turn help them to understand situations and relationships. By regulating emotions skillfully, student can harness their own emotions and also use their empathetic response to others in helpful ways (Panneerselvam and Sujathamalini, 2014).

### Dyscalculia and Pseudo-dyscalculia

The emotions meaning to efforts in the subject of mathematics is important. Pseudo-dyscalculia causes the same difficulties as dyscalculia, but the explanation for the difficulties lies not in cognitive dysfunction but in the psychosocial environment, i.e. in emotional blockings, or a family history of failure in mathematics. Students with pseudo-dyscalculia have the cognitive ability to succeed in mathematics, but despite this, they run into problems. They may have committed themselves to the idea that they absolutely cannot be successful in the subject. This thought can be deeply rooted, and perhaps linked to ideas that they are not smart enough. In these cases, the student fails because they do not expect to succeed; just the opposite, they have a clear expectation of failure. Because the mathematical difficulties may due to emotional blockings, it is important that the tests not only measures cognitive intelligence but also personality and emotional maturity. In pseudo dyscalculia, no obvious cognitive dysfunction occurs that can explain the mathematical difficulties. Instead lack of self esteem, feelings of stupidity and other types of emotional blockings which lead to expectation of mathematical failure are evident.

Difficulties may also arise due to gaps in learning. Girls have more trouble with mathematics and are diagnosed with pseudo-dyscalculia more frequently than boys, although their intelligence and potential for mathematical success is equal. (<https://www.hummingbirdza.com/resources/dyscalculia>)

### Emotional Distress

Researches demonstrate that students with dyscalculia experience emotional distress related to their difficulties. Students with dyscalculia tend to have higher levels of emotional concerns, such as anxiety, depression, loneliness, and low self-esteem, than do their peers without disabilities. It is now well established that mathematical activities can cause anxiety and that these are specific to mathematics and not just to any difficult task (Richardson and Suinn, 1972; Hembree, 1990; Ashcraft, 1995). Anxiety itself is known to have effects on a wide range of cognitive functions, including those that may affect mathematics performance, such as working memory (Eysenck and Calvo, 1992). However, the emotional effects, both long term and short term, of struggling with mathematics tasks that the peers find very easy are, as yet, unknown. A study (Butterworth, 1999) revealed that 9-year-old dyscalculia's suffered considerable anguish during the daily mathematics lesson.

One of the main effects is that *anxiety builds up and self-esteem goes down* and these students often sit in classrooms not really understanding very much at all. As a result they often get left behind in class. Learning from peers is difficult because those with dyscalculia struggle to understand or remember. Then they begin to cover up, even becoming disruptive or the class clown in order to get attention to survive in class and to avoid facing the maths (Rubinsten and Tannock, 2010).

*Negative self-esteem* leads to a high level of mathematics anxiety and self-condemnation leads to self-defeat, poor performance and failure in mathematics. The degree of performance in mathematics and mathematics anxiety are related. Poor performance weakens the morale of the students which results to lack of interest. Poor performance was caused by series of mistakes and mistakes on the other hand were a result of fear, uneasiness, tension and frustration. All these lead to high level of mathematics anxiety. Poor performance i.e. low grade or failure in mathematics leads to lack of interest which subsequently leads to high level of mathematics anxiety (Israel and Olubunmi, 2014).

The emotional intelligence such as *emotional disturbance, frustration, fear* increases the level of mathematics anxiety. Emotional disturbance during mathematics class leads to less frequent in mathematical computation and manipulation of numbers and more mistakes. However, this result in poor performance in mathematics which results in discouragement and finally high level of mathematics anxiety (Panneerselvam and Sujathamalini, 2014).

Children with dyscalculia have trouble reading numbers and picturing them in their mind. They might mistake a three for an eight because the numbers look similar. They also have trouble counting objects and organising them by size. Memory is another issue.

Children with dyscalculia may not remember the correct order of operations to follow in solving maths problems. Difficulties like these can lead to a lifelong fear of mathematics (<http://theteachingnut.blogspot.in/2014/03/fear-of-maths-or-dyscalculia.html>). In the views of Ashcraft and Faust (1994), highly anxious mathematics individuals will be less fluent in computation, less knowledgeable about mathematics and less likely to have discovered special strategies and relationship within the mathematics domains. *Self judgment and determination* goes a long way in the learning outcomes of students. If the students view themselves positively, believing that they have the ability and the potential to perform excellently well in mathematics, this will inject some strength and interest in them. Hence, positive learning outcomes in mathematics are likely to be obtained. *Self condemnation* on the other hand destroy the students confidence and lower their morals. These accelerate the rate of fear, tension and anxiety which leads to poor learning outcomes in mathematics (Israel and Olubunmi).

### Recommendations

One-on-one instruction is essential for all students - especially those with dyscalculia learners. By creating study time after school hour, teachers can help the student with their homework. Making the students believing in them paves a positive role in self-judgement which in turn will increase their strength, motivate them to try several problems and their intelligence ability will be open up to receive new concepts. Teachers can put on their effort in finding the best method that will bring the best performance out of the students. Emphasis can be laid on steps taking while marking mathematics, grading right/wrong so as to reduce poor performance to the barest minimum. Various techniques may be encouraged and adopted in conducting the continuous assessment. Various methods such as project work, take home assignment, open book test etc. shall be employed so as to reduce failure to the barest minimum. Students shall try to avoid situation that can create emotional imbalance. In case of an inevitable situation, they may relax themselves by playing games, watching films or listening to music to ease their tension before coming back to solve mathematics problems. Finally, teachers ought to bear the issues of individual difference while attending to their students. They need to counsel their students whenever they notice something strange like fear, worrying, frustration or any sort of emotional disturbance in their students that can hinder absolute concentration.

### Conclusion

The dyscalculia may be mild, moderate or severe; they are to understand expressing their own emotions. Even though they struggle in one or more areas of learning, they may excel in other area. But they experience emotional problems. With the integrated instructional procedures for learning and emotional problems, students with learning disabilities can learn successfully. As especially in learning conditions emotions of the students enlarge and enlighten the mind and to be effective and successful lead in scholastic achievement and in personal life. According to Goleman (1996), 80% of a student's success in life depends on emotions, and only about 20% depends on IQ. Hence emphasis on education and improving different aspects of emotions can be effective in achieving the goal of education faster of students with dyscalculia.

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