

Dyscalculia and affects towards mathematics. A systematic review

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Just as mental abilities or language develop as a consequence of children's experience and maturation, so does emotional development progress in the same way (Brett et al., 2018). Therefore, it is important to take into account healthy emotional growth from an early age, both at school and in the family and social environment. Traditionally, the poor popularity that mathematics has had has considerably disadvantaged its learning and teaching, flourishing a set of barriers towards this discipline. The beliefs, attitudes and emotions of teachers and students condition the way in which they approach mathematical objects in a learning space. The awareness of this challenge is considered essential to investigate the affective aspects they manifest and to have the possibility to modify them in order to overcome the existing barriers (Grootenboer & Marshman, 2016).

In the field of Mathematics Education, particularly in relation to mathematics learning difficulties, research into the affective dimension has been largely overshadowed by the cognitive dimension (Espina et al., 2022). However, for about half a century, studies have been carried out which show that the affective domain is a very important element to be taken into account in the teaching and learning of mathematics (Schukajlow et al., 2019). Most of the research on the affective mathematical profile of students has been carried out with students with normal academic performance. But, what has been studied about the affective domain in students with math learning difficulties and, more specifically, in those with dyscalculia? The main objective of this study is to find out, doing a first approximation, what has been researched about the affective profile of students with dyscalculia in the existing literature. To achieve this goal, a systematic review was conducted on 22 August 2022 following the guidelines of the PRISMA 2020 statement (Page et al., 2021). The search was carried out by combining the terms linked to dyscalculia (d*calculi*, math* learning disability*, math* disorder*, ...) with aspects of the affective domain (emotions, attitude, math* anxiety, beliefs, ...) in various bibliographic sources (Web of Science, Scopus, Psychology Database, Dialnet, TESEO Doctoral Theses Database and Open Access Theses and Dissertations). We have included studies in any language, whose publication dates are within all the time periods offered by the databases, which are of scientific nature and which evaluate some characteristic of the affective profile presented by children with dyscalculia. On the other hand, we have excluded studies that only talk about the affective characteristics of students with dyscalculia by referring to other research, and those that have been carried out with adults, covering only school age. Initially, 368 results were obtained, but after four screenings, the review consisted of 24 publications. In these screenings, documents that did not meet the established inclusion and exclusion criteria were eliminated, duplicates were removed and, finally, more articles were added from the bibliographic references of the publications read, using the snowball method. Two clear groups were found among the literature reviewed: a group formed by research on maths anxiety, this being the main theme (14 publications out of 24), and a group formed by studies that examine different constructs related to the affective area, but these groups do not coincide with each other (self-concept, emotions, stress, internalising problems, self-

esteem, motivation, ...). Research examining the relationship between dyscalculia and maths anxiety shows a higher level of maths anxiety in students with dyscalculia compared to typically developing students.

The results of the review lead us to conclude that the study of aspects related to the affective profile of students with dyscalculia has been very limited and focused mainly on one of the possible emotions that can trigger dyscalculia, maths anxiety. More studies are considered necessary to investigate and demonstrate all the elements that form part of the affective domain (beliefs, emotions and attitudes) in relation with dyscalculia, which, if they are negative, can influence and aggravate the difficulties experienced by these students in learning mathematics.

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