

Module 17: Dyscalculia Handout 1

Provided by WVDE

What issues are co-morbid with dyscalculia?

- **Intellectual Ability**

This is not *technically* a co-morbidity, but a misconception that must be addressed. There is a misconception that dyscalculia and other specific learning disabilities can only occur in individuals with average or above-average intelligence. As we learned, dyscalculia is a genetic or neurobiological variation. This variation is not limited to those with only average to above-average intelligence (a score of 85-90 or above). Outside of a specific caveat that comes with the diagnostic features of intellectual disability, a person with any intellectual ability score (typically a score of 70 or above) could potentially have dyscalculia. The "slow learner" theory (i.e., a student whose academic achievement scores align with their below-average intellectual ability scores) does not have a research base and thus should not be utilized. If a person has an intellectual disability, it is not to say that they do not have a neurobiological marker for dyscalculia. What it means is that, due to the nature of the disability, the intellectual disability is considered the **primary** reason for their struggle with academics and life skills.

- **Attention Deficit Hyperactivity Disorder (ADHD)**

ADHD frequently occurs alongside dyscalculia. About 25-30% of students with ADHD also have dyscalculia. Some of the most common diagnostic features of ADHD are difficulties with executive functioning (including working memory) and processing speed. All of these processes are crucial for effectively solving mathematical problems. Executive functioning is a term that encompasses our working memory, mental flexibility/attention shifting, and self-regulation. Working memory is our ability to store information in our brains for immediate use. Limited working memory can cause issues with memorization of math facts and the ability to follow specific steps in a math calculation. Struggles with shifting attention between tasks and maintaining attention can cause struggles when a student begins to work on multi-step math problems. Students with ADHD can struggle to remember which step they are at as well as have difficulty shifting from different calculations such as going from multiplication to addition. Lastly, processing speed is the ability to process information quickly and help encode facts in long-term memory. While math ability does not have to do with speed, the inability to complete math problems quickly can

affect student performance.

- **Math Anxiety**

Math anxiety is a feeling of tension, apprehension, or fear that interferes with math performance and has little to do with overall intelligence. It is incredibly common in students with dyscalculia. Some anxiety or stress is beneficial as it motivates us to act or accomplish tasks; however, elevated levels of anxiety, math or otherwise, can be debilitating and cause significant distress. Although elevated levels of math anxiety do not necessarily cause SLD in mathematics, these variables can have compounding negative effects on individuals with or without a learning disability. When a student with dyscalculia is anxious, functions like processing speed, the ability to switch between tasks, and working memory stop working as efficiently, which can exacerbate the disorder.

- **Behavior**

Most emotional and behavioral problems for students with dyscalculia manifest out of frustration with school situations. It can be common to see increases in anger due to a low frustration tolerance during academic activities. It's also common to see students engage in task avoidance during math. These behavior manifestations can look extremely different in each child. One student may get frustrated and tear up a paper, another student may frequently ask to go to the restroom during reading activities, and another student may intentionally engage in poor behavior to get sent to the office (and thus avoid completing an activity). With all students, regardless of possible disability, it is imperative to look at the "why" or function behind challenging behaviors. Don't simplify or dismiss behaviors as a student being a "bad kid" or "defiant." All behavior has meaning and serves some purpose for the student.

- **Depression and Low Self-Esteem**

Students with dyscalculia are at a higher risk for feelings of low self-esteem and low mood due to their academic struggles. Students with dyslexia can be very aware that they are behind their peers in reading, which may cause them to think less of themselves. They can sometimes feel that their environment controls them instead of feeling powerful and productive. Research has shown that students with high self-esteem who are successful attribute their successes to their own efforts, while students with low self-esteem attribute their successes to luck. All of this together

can create issues with self-image, social issues when interacting with friends, and, at times, depression.

- **Dyslexia**

The estimates for the comorbidity between dyslexia and dyscalculia are a wide range. One statistic said that anywhere from 17-60% of people with dyscalculia also have dyslexia (Grant et. al., 2020). Historically, dyslexia has been researched much more significantly than dyscalculia, which is part of the reason for such a wide range. It can be difficult to determine if the dyscalculia is its own standalone condition or if it's a side effect of dyslexia since math involves more reading as it gets more difficult. There are, however, key features to help determine this, such as students with dyscalculia alone tend to have difficulty subitizing but do not have difficulty with phonological processing.

- **Other Medical Conditions**

It must be noted that there are other medical conditions that may cause acquired dyscalculia. This course is specifically focused on **developmental dyscalculia**, which is typically what people think of when using the word "dyscalculia." Developmental dyscalculia is considered to be a genetic condition that starts to manifest in early childhood. Most often, this type of dyscalculia can be remediated with appropriate academic intervention. Acquired dyscalculia can manifest the same as developmental dyscalculia, but it was not present in early childhood, nor does it have a genetic link. This type of dyscalculia comes from either a severe illness or injury to the head. In the educational setting, particularly if a student needs a 504 or special education services, the term "acquired dyscalculia" is not utilized. Since acquired dyscalculia is a symptom of another condition instead of a standalone genetic variation, it is more appropriate to reference the condition that caused the acquired dyscalculia.

The medical condition most consistently associated with difficulties with mathematics is spina bifida myelomeningocele, though difficulties in written expression and reading can also be seen in this population (Lindquist et al., 2022). Similarly, very high rates of math learning disabilities are also seen in Turner Syndrome, a genetic syndrome affecting biological females, though a growing body of research suggests that differences are less prominent on untimed tests (Baker & Reiss, 2016). Dyscalculia may also be seen in other conditions such as epilepsy, stroke, or brain tumors, particularly if there is prominent involvement of the right

hemisphere. Additionally, individuals with a history of pre- or peri-natal stroke may be at increased risk for math impairments regardless of lesion location (Li et al., 2022). For students who demonstrate acquired dyscalculia from another medical condition, the prognosis and recovery can vary widely, as there's an unlimited number of ways and levels of severity to such damage to the brain. Remediation of academic issues associated with medical conditions may not follow as linear of a timeline as developmental dyscalculia.