Culture Plays a Role in Dyslexia

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WEDNESDAY, Sept. 1 (HealthDayNews) -- A new study reveals that cultural factors influence how dyslexia manifests itself by finding that the disorder affects the brains of Chinese and English speakers differently.

"Our findings argue against a simple biological unit theory of dyslexia," said the study's corresponding author, Lihai Tan, a research fellow at the U.S. National Institute of Mental Health and associate professor of linguistics at the University of Hong Kong. "Dyslexia is part of culture."

"The findings are very important and innovative," said Guinevere Eden, director of the Center for the Study of Learning and associate professor of pediatrics at Georgetown University Medical Center. "They provide solid evidence for the fact that the neural basis of reading is complex and will differ depending on the nature of the writing system. After all, reading is not a skill that is innate, and hence the mechanisms that the brain will draw upon to accomplish this task is likely to differ depending on the demands of a particular writing system."

It has been largely assumed that dyslexia, even in different languages, has the same biological underpinning, with many researchers believing the biological root lies in the left temporoparietal region of the brain. Most studies, however, have looked at alphabetic languages such as English and Italian, which rely on phonology, and not Chinese or Japanese, which rely more heavily on orthography, or written symbols.

The new study used functional magnetic resonance imaging to study the brain activity of Chinese children as they performed different reading-related tasks. Of 16 children in the fourth and fifth grades at Yuquan Primary School in Beijing, eight were impaired readers while eight were normal readers.

In the first task, children were asked to judge whether two Chinese characters were homophones -- pronounced alike but with different meanings. "This task measures the relationship between the visual shape of characters and the pronunciation," Tan explained.

In the second task, the children were asked to decide if a pair of characters were the same size. "This was supposed to measure the..."
relationship between visual shape and characters' meaning," Tan said.

The left middle frontal gyrus brain region in children with dyslexia was activated, suggesting there is an important neurological difference between impaired English and Chinese readers, the researchers said.

"You wouldn't be completely surprised that different parts of the brain are being activated during [different language] tasks," said Gordon Sherman, executive director of the Newgrange School and Educational Outreach Center in Princeton, N.J. "It's a different task even though it's a language task."

By the end of first grade, Chinese children will learn 600 characters, out of a total of 5,000 to 6,000 needed to be literate, Eden said. That's compared to a paltry 26 letters in the English alphabet. "Chinese have to have a very good visual memory," she said. "Every one of those characters also has multiple meanings, so your brain requirements are different."

The findings have enormous implications for helping impaired readers in China, where 2 percent to 7 percent of children are dyslexic (out of a total population of about 1.4 billion). "Current remediation programs in the U.S. emphasize a phonetics approach," Tan said, adding such an approach probably won't work in China.

The study also highlights the importance of paying attention to differences in languages. Even languages as similar as English and Italian can exhibit differences when it comes to dyslexia. "One study showed that the degree of impairment when reading differed depending on the language," Sherman said. Another case report showed that a boy was dyslexic in English but not in Japanese, Eden pointed out.

"We're tempted to say we've found the answer and move on. This is a wake-up call," Eden said. "This reminds us that this is a very complicated disorder, and we need to keep a very open mind and be ready to come up with a range of interventions. No one intervention is going to help. That's what people keep hoping for, but it's never going to happen."

More information

For more on dyslexia, visit the International Dyslexia Association.