Medical Xpress

Gyroscopes can help diagnose ADHD

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The latest miniaturised movement sensors, incorporating both accelerometers and gyroscopes, can be used to provide an objective diagnosis of attention-deficit/hyperactivity disorder (ADHD), according to new research in the journal *Medical Engineering and Physics*.

Recent advances in technology have led to affordable, miniature, inertial sensors that incorporate both accelerometers and gyroscopes. This enables a device no bigger than a wristwatch to measure a wide range of movements, such as tilting, rotation, acceleration and sudden stops. The researchers attached such devices to the waists and ankles of 43 children in the age range 6-11, while they attended a psychiatric consultation lasting about an hour. They were able to use the movements they recorded to distinguish ADHD-diagnosed children from other children with 95% accuracy. The study is published in the July edition of the journal Medical Engineering and Physics.

ADHD is one of the most common childhood psychiatric disorders, characterised by a group of behavioural symptoms that include inattentiveness, hyperactivity and impulsiveness. Thirty years ago, around 1- 3% of school children were attributed with ADHD whilst recent estimates range between 3 -10%. However the increase in recorded cases does not necessarily mean that ADHD is becoming more common. It could be at least partly due to the subjective nature of the current diagnostic method, which involves the assessment of a range of behavioural criteria. This has led to great interest in a more objective way of diagnosing the condition.

The researchers found that a relatively small number of movement features (5–10) can discriminate between ADHD-diagnosed and control subjects with high sensitivity and specificity. "There have been previous studies using accelerometers to measure movement," explains lead author Niamh O'Mahony, "But we have found that the additional use of gyroscopes provides more discriminative information to classify ADHD and non-ADHD cases." Not only could the new test lead to an objective diagnosis for ADHD but it could also be used to measure how well ADHD-diagnosed patients respond to treatments. Work has begun on a more extensive study.

More information: "Objective diagnosis of ADHD using IMUs." Niamh O'Mahony, Blanca Florentino-Liano, Juan J. Carballo, Enrique Baca-García, Antonio Artés Rodríguez. *Medical Engineering & Physics* - July 2014 (Vol. 36, Issue 7, Pages 922-926, DOI: 10.1016/j.medengphy.2014.02.023)

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