**Details for ADHD Study Assessments**

**Test of Variables of Attention (TOVA)** (Taken from the TOVA Professional Manual (Leark, Greenberg, Kindschi, Dupuy, Hughes, (2008))

The Visual T.O.V.A. is a visual attention test where subjects are presented with visual targets and nontargets (See Figure 2). The subjects are instructed to press the microswitch as quickly as possible after seeing the target stimulus. They are instructed to not press the switch (i.e., do nothing) when they see the nontarget. The duration of the test is 21.6 minutes. Testing is usually scheduled as a half-hour session. Since the visual T.O.V.A. is a visual continuous performance test, use of the test with visually impaired subjects is not advised.



*Figure 2. TOVA Stimuli, Target (left)) and Nontarget (right)*

**Quantitative Electroencephalography (QEEG)** (Taken from Hughes and John (1999))

A QEEG is an objective measure of the brain’s electrical activity. An early study by Chabot, Merkin, Wood, Davenport, and Serfontein (1996) found that QEEG is useful in predicting and monitoring treatment outcomes, whereby baseline QEEG differences have been reported to differentiate between ADHD responders and nonresponders to psychostimulants.

In QEEG, multichannel recording (usually 19 electrodes at standardized positions) of eyes-closed, resting or “background” EEG are visually edited and a sample of artifact-free data, usually 1 to 2 minutes, is analyzed, where the power at each frequency of the EEG averaged across the entire sample, known as the *power spectrum* is quantified.

In 2013, the FDA approved QEEG as an adjunct tool in the differential diagnosis of ADHD from other disorders that mimic the symptoms of ADHD.

Electrodes are applied using a cap with fixed locations that is fixed to the child via a band strapped to their chest. The scalp is prepared with a rubber brush to remove any dead skin cells. The forehead and earlobes (which requires the attachment of two separate electrode clips) are prepared using a non-irritating adhesive gel. After the cap is placed on the child’s head conductive gel is then inserted into each electrode on the cap. Impedence checking is conducted for each electrode with the aim of achieving less than or equal to 5 kilo-ohms. If 6 kilo-ohms or greater results then the electrode is manipulated in an attempt to improve connection and impedence is tested again. This is repeated until all electrodes show the desired reading.

When the electrodes are attached the child’s eyes are gently covered with an eye mask and they are asked to rest. When the child is appropriately relaxed then activity is recorded for a period of 5 minutes.

Altogether with preparation and recording the procedure should take 45 minutes to one hour.

**Test of Everyday Attention for Children (TEA-Ch) (Manly, Robertson, Anderson and Nimmo-Smith, 1999)**

The Test of Everyday Attention for Children (TEA-Ch) is a standardized and normed clinical battery for children that allows for comparative assessment across a number of attentional capacities. The battery is made up of a number of game-like subtests that assess selective attention, attentional control/switching and sustained attention. As the TOVA is a measure of sustained attention, the proposed study will only use the subtests from the selective attention and attentional control/switching factors.

**Selective Attention Tests:**

**Sky Search:**

A brief, timed subtest where children have to find as many ‘target’ spaceships as possible on a sheet filled with very similar distractor spaceships. The second part has no distractors. Subtracting part 2 from part 1 gives a measure of a child’s ability to make this selection that is relatively free from the influence of motor slowness.

**Map Mission:**

This is a brief subtest that forms an important accompaniment to the Sky Search subtest in assessing selective attention. Children have to search a map to find as many target symbols as they can in one minute.

**Attentional control/switching Tests:**

**Creature Counting:**

Children have to repeatedly switch between the two relatively simple activities of counting upwards and counting downwards. They are asked to count aliens in their burrow, with occasional arrows telling them when to change the direction in which they are counting. Time taken and accuracy are scored in this test.

**Opposite Worlds:**

In the first ‘practice’ world, Same World, children are asked to follow a path naming the digits 1 and 2 that are scattered along it. In the Opposite World they do the same except this time they have to say ‘one’ when they see a 2 and ‘two’ when they see a 1. The speed with which children can perform this cognitive reversal is the crucial measure from this brief subtest.

**Actigraphy**

A wrist actiwatch is small device, like a watch, which measures the amount of your arm movement and stores it electronically in periods of one minute length. From this information we can obtain information about your sleep/wake patterns, the quality of your night’s sleep and how active you have been during the day. The wrist actiwatch also has a small light sensor on it and this helps us confirm your ‘lights out’ time at night and also measures how much light you are getting every day. It can collect activity and light exposure information over periods of four weeks or more.

The actiwatch is normally worn on the non-dominant hand – that is the one NOT used for writing. It is waterproof so it can safely be worn during showering. However, we suggest taking it off if you are going swimming.

As we would also like to measure light exposure levels please try to avoid the small light sensor on the actiwatch from being covered by your clothing. It is extremely unlikely that you will experience any irritation or discomfort from the wearing of an actiwatch. It is a good idea to dry beneath the watch band after showering. A small piece of soft cloth or tissue could be inserted beneath the actiwatch if there is any skin sensitivity. Please let us know if you are experiencing any discomfort that concerns you.

Please avoid exposing the actiwatch to any harsh detergents or chemicals. Please be aware that the actiwatch is an expensive and specialised piece of electronic equipment. There is a small button on the side- please ignore this. It does not matter if you press this or not (it is NOT an on/off button).

For the current study, please put the actiwatch on your child’s non-dominant wrist on the night we have nominated as Night 1. Please ensure your child wears the actiwatch each night for at least 7 days following the provided instructions above. If you remember, please make sure your child presses the small silver button on the side just before they fall asleep and when they wake up for the last time in the morning.

**ADHD Rating Scale (ARS) (Dupaul, 1991)**

The ARS is an 18 item scale, age range of 5-17 years and is often used to measure treatment response in ADHD children (Heilskov Rytter, 2015).

**Conners’ Rating Scales, Third Edition (CRS3) (Conners et al., 1976)**

Thorough assessment of ADHD related behaviours with an age range of 6-18 years that is also often used to measure treatment response (Heilskov Rytter, 2015).

**Diet Compliance Diary**

The diet compliance diary provides parents of participants with an opportunity to monitor dietary compliance, including the elimination of gluten, additives, preservatives, colourings, cereal grains and refined carbohydrates. There is also space for parents to write down any comments relating to issues or challenges they may have faced. For ease of completion, the diary will be made available online via Smart eHealth where parents can complete the form every four weeks.

**References**

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