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## **Social aspects of Attention Deficits Hyperactivity Disorder (ADHD)**

### **A review of the doctoral thesis by Peik Gustafsson: Bio-social aspects of Attention Deficit Hyperactivity Disorder (ADHD)**

Peik Gustafsson defended his doctoral thesis about ADHD at Lund University the 5<sup>th</sup> of June. This is the 4<sup>th</sup> doctoral thesis using data from the Bunkeflo project- a health promoting lifestyle. Ericsson's (2003, 2008a) was about motor skills and learning, Lindén (2006) wrote about bone and osteoporoses and Dencker (2007) about body fat and aerobic fitness.

Gustafsson's purpose was to study biological and social factors of importance for the diagnosis ADHD. The focus is on how biological factors are related to ADHD symptoms, how family function is related and how the family reacts when the ADHD symptoms have diminished. The thesis includes four studies described in four different papers and a short summary in Swedish. The first study deals with associations between cerebral blood flow, electroencephalogram (EEG), behaviour symptoms, cognition and neurological so called "soft signs". The second is about treatment of ADHD with amphetamine. In the third article relationships between ADHD symptoms and maturity are being studied. The fourth study is about reliability and validity of assessment of soft-signs, i.e. motor function, in children with and without ADHD.

In study 1 and 2 children from clinical groups in Malmö, Lund and Umeå were examined (n=30, n=43 respectively). These studies show that ADHD symptoms have imported associations with neurophysiologic factors. A low blood-flow at rest was found in the right frontal lobe and two different functional networks were studied. Gustafsson (2008) formulates the hypothesis that some children with ADHD have a dysfunction of the cerebellum, temporal lobes and sub cortical areas correlated with motor dysfunction. The results do not support the idea that ADHD symptoms are a mere consequence of bad parenting. The parents showed less hostility, more responsibility and empathy towards their child when the ADHD symptoms diminished after three months treatment with central stimulant medication.

Study 3, 4 and a fifth study, not yet published, by Gustafsson, Ericsson, Lindén, Karlsson, Thernlund and Svedin (2006) include data from the Bunkeflo project in Malmö, i.e. seven to nine year old children in grade one to two (n=148) and a comparison group in grade three from the same school (n=103). The results show that there is a strong correlation between ADHD and motor dysfunction and that motor function can be assessed in a reliable and valid way (Gustafsson, Thernlund, Besjakov, Karlsson, Ericsson & Svedin, 2008). Motor dysfunction may be a sign of immaturity but the ADHD symptoms did not correlate with age or with maturity dependent variables in this study. The value of using the concept of immaturity as defined by parents' and teacher's ratings can be questioned in the field of ADHD research, according to Gustafsson (2008).

Examinations of motor function were carried out with a neurological method used by Gillberg (1985) based on earlier work by Touwen and Prechtl (Touwen, 1979), which includes items associated with the concept Minor Neurological Deficit (MND). The physical education teacher made group examinations of the children's motor skills using the Motorisk Utveckling som Grund för Inläring [Motor skills as a base for learning] (MUGI) observation checklist (Ericsson 2007, 2008b) with items from every-day motor and sport activities of the kind usually discussed when defining the concept of Developmental Coordination Disorder (DCD).

When the neurological examinations were compared with results from the MUGI checklist, they were found to predict motor dysfunction according to the physical education teacher with reasonably good sensitivity and specificity, which was also described by Ericsson (2003). For 22 of 23 children examined, the results were consistent in identifying children with good motor skills, small and major motor skill deficits respectively. The MUGI examination was found to have the strongest correlation with ADHD-diagnosis and combining the two methods seems to give a better description of the child's motor functions than either of the examinations used alone. The total sum of the soft-signs examinations, including parents' descriptions, gave an excellent prediction of ADHD-diagnosis.

According to Gustafsson, Thernlund, Ericsson, Lindén, Karlsson & Svedin (2007) the items in Prechtl's test can be questioned as being useful in detecting soft signs when examining children with a suspicion of ADHD and/or DCD. Several of the items in Prechtl's test used in the study showed a "floor-effect", i.e. most of the children had no problems performing the tests and thus scored 0, with only a few scoring 1 or 2. Examining only a few items with high reliability seems to be sufficient when screening children with attention deficit for mild to moderate motor dysfunction.

Internal reliability for the nine items in the MUGI checklist has been tested (Ericsson, 2003, 2008a). The average correlation between three teachers' ratings from observing the same pupils ( $n = 22$ ) was 0.75 according to Spearman's rank correlation, showing a significant correlation between different observers' ratings. A video camera was used during the motor observations to ensure that there was no important information missed by the observers. An analysis showed no significant differences between the observers' ratings and what could be seen on the video films.

To test reliability over time, motor observations with the MUGI checklist were carried out twice in ten days (test-retest) with the same pupils ( $n = 22$ ) and the same teachers ( $n = 3$ ). Although there are many difficulties in repeating a test this way, the correlation between the teachers' ratings from the two observation times were satisfactorily high, on average 0.78 according to Spearman's rank correlation.

Another of Gustafsson's (2008) conclusions is that assessing motor function is highly relevant since children with ADHD have motor dysfunction in higher frequency and degree than children without ADHD. Children with a severe degree of ADHD usually have poorer motor function than children with a mild degree of ADHD. In addition the children with motor dysfunction (DCD) seem to be at greater risk of having a severe and co morbid ADHD and they seem to have an especially high risk of having social difficulties of the type seen in Asperger's syndrome. The results thus point to important interactions between biological factors, like those causing ADHD, and social factors like family interaction.

The thesis is interesting and although it comprises a wide area of different factors related to ADHD symptoms it has a good structure and is well written, which makes it understandable even to those not working in the field of psychiatry. It can be recommended to anyone who wants to learn more about ADHD and motor skills examinations. More information about the research in the Bunkeflo project can be found on [www.bunkeflomodellen.com](http://www.bunkeflomodellen.com) and on [www.mugi.se](http://www.mugi.se).

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