

**Project title:** Childhood Attention-Deficit/Hyperactivity Disorder (ADHD): A longitudinal study identifying shared and unique involvement of prenatal and (early) perinatal risk factors for developing ADHD

**Project leader:** Dr. Petra Hurks

**Function:** Assistant professor

**Collaborators:** Dr. Carel Thijs, Dr. Martin van Boxtel

**Proposal (250 words):**

ADHD is one of the most common neurodevelopmental disorders in children worldwide. It is characterized by inattention, hyperactivity- impulsivity or a combination thereof (APA, 2013). ADHD is often associated with (life-long) functional impairments (e.g., academic impairment, addictive behavior) and a lower quality of life. Besides genetic factors, pre- and perinatal risk factors (PPFs) are likely to determine if ADHD becomes manifest. Etiology and pathogenesis of ADHD are therefore believed to be multifactorial, but these are still poorly understood. The majority of studies published are cross-sectional, studying the developmental history of the child with ADHD retrospectively, instead of a longitudinal research design. This study aims to test shared and unique involvement of PPFs for ADHD by use of an existing, longitudinal data set, i.e., the KOALA study (see [www.koala-study.nl/koala-birth-cohort-study](http://www.koala-study.nl/koala-birth-cohort-study)). In the KOALA study, we have followed (and continue to follow) over 2,500 children, born between 2001-2003, from pregnancy into puberty, together with their families. We have collected information on multiple PPFs (biological, cognitive, behavioral (incl. eating habits)) at several time points, both prenatal and perinatal. In 1,000 of them, we contacted their general practitioner and asked about diagnosis of ADHD and medication for this condition when the children were 8-10 years. As many as 8% of the children were reported to have a diagnosis of ADHD, and 7% uses methylphenidate, figures comparable to the Dutch general population. Based on these data, we can now study the relation between PPFs and ADHD and make strong inferences. For instance, we observed a strong association with pre-pregnancy BMI of the mother and that the prevalence is much lower in participants with alternative lifestyles. This leads to several interesting hypotheses that can be studied with the data available, such as: 1) Is this an effect of the intrauterine environment (Is the paternal BMI less influential)? 2) What is the role of fatty acids that are involved in brain development (and how is this affected by diet and genetic variants of fatty acid metabolism)? 3) What is the role of breastfeeding, mother-infant bonding, temperament, impulse regulation, and SES? 4) What factors in alternative lifestyle determine the lower prevalence of ADHD or/and medication use? Techniques to be used: Our plan is to study these questions in the KOALA Birth Cohort Study. Data on PPF and ADHD have been collected for children, fathers and mothers. This includes a repeated administration of questionnaires and biological samples. We have data on e.g., blood samples (measuring e.g., fatty acids in blood, FADS gene variants), microbial data (infections, gut microbiota), questionnaires measuring breastfeeding and breast milk composition, nutrition, physical activity (including accelerometry), parenting practices and parenting styles; home, neighbourhood and childcare environment, cognition, and behavior (incl. ADHD diagnoses and medications, prescribed by physicians). For a complete overview (incl. info on when the data are collected), see [www.birthcohorts.net/birthcohorts/birthcohort/?id=143](http://www.birthcohorts.net/birthcohorts/birthcohort/?id=143). The PhD candidate has access to all data to answer above mentioned questions (and more). Also, there is the opportunity for a follow-up of families enrolled in KOALA.

**Requirements candidate:** Highly motivated student with excellent English communication skills (verbal and writing) and proactive and resolute attitude.

**Keywords:** ADHD, mother-infant bonding, fatty acids, life style, intervention, longitudinal study

**Top 5 selected publications:**

1. Thijs, C., et al. (2011). Fatty acids in breast milk and development of atopic eczema and allergic sensitisation in infancy. *Allergy*, 66, 58-67. IF:7.361;
2. Moltó-Puigmartí, C., et al. (2010). FADS1 FADS2 gene variants modify the association between fish intake and the docosahexaenoic acid proportions in human milk. *Am J Clin Nutr*, 91, 1368-76. IF:6.926;
3. Remmers, T., et al. (2015). Moderators of the Relationship Between Physical Activity Enjoyment and Physical Activity in Children. *J Phys Act Health*, 12, 1066-73. IF:1.946;
4. Kroes, M., et al. (2001). Child psychiatric diagnoses in a population of Dutch schoolchildren aged 6 to 8 years. *J Am Acad Child Adolesc Psychiatry*, 40, 1401-1409. IF:7.860;
5. Tremmery, S., et al. (2007). The use of health care services and psychotropic medication in a community sample of 9-year-old schoolchildren with ADHD. *Eur Child Adolesc Psychiatry*, 16, 327-336. IF:3.339.