

Department of Psychiatry and Psychotherapy

Division of Child and Adolescent Mental Health

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Research Focus

- Prenatal risk factors for infant, child and adolescent development
- Long-term effects of early cardiac surgery on child and adolescent development
- Evaluation of therapeutic interventions and treatment success in adolescents with Anorexia nervosa
- Parental stress in child and adolescent psychiatric care
- Prenatal trauma and fetal programming in a mouse model

Structure of the Division

Professorships: 1

Personnel: 156

- Doctors (of Medicine): 27
- Scientists: 6 (thereof funded externally): 2)
- Graduate students: 10

Treatment units: 35 inpatient, 23 day patient; 15 day patient (in cooperation with Klinikum Fürth)

Clinical focus areas:

- Attention deficit/hyperactivity disorder (ADHD)
- Tic and obsessive-compulsive disorders
- Anxiety and depressive disorders
- Posttraumatic stress disorders
- Eating disorders
- Autism spectrum disorders
- Reduced intelligence with psychiatric comorbidity
- Regulation, feeding and behavior disorders in early childhood

Research

The aims of the scientific projects of our Division are to contribute to a better understanding of the developmental processes and the neurobiological basis of mental disorders in children and adolescents and to learn more about the underlying mechanisms of therapeutic interventions. The main topics addressed by the research unit (headed by PD Dr. Anna Eichler and Prof. Dr. O. Kratz) are described below.

Prenatal risk factors for infant, child and adolescent development

PI: A. Eichler

In the longitudinal FRANCES (Franconian Cognition and Emotion Studies) study, we are investigating the long-term consequences of prenatal risks (including alcohol, depression, stress) for child adjustment at ages 6-9 (study period 2012-2015) and 12-14 (study period 2019-2021) in cooperation with the Departments of Obstetrics and Gynecology and of Psychiatry and Psychotherapy. Developmental status is measured in a multilevel design in cognitive, emotional, and social outcomes: In addition to neuropsychological (including intelligence testing) and neurophysiological (including event-related brain electrical potentials) developmental measures, the focus is on neurobiological markers (including alcohol metabolites in neonatal meconium, cortisol concentrations in saliva and hair, high sensitive inflammatory markers in blood). Results to date have shown, among other things, that even subliminal 'non-visible' prenatal alcohol consumption affects child development, as evidenced by reduced cognitive performance, altered cortisol secretion, impaired brain electrical activity, and facial features. Child biomarkers of intrauterine alcohol exposure were superior in predictive power to pregnant women's self-reports in this regard. Prenatal depressive symptoms were associated with an irritated cortisol stress system and, in combination with low socioeconomic status and inconsistent parenting behavior with emotional and behavioral child problems. Also in cooperation with the Departments of Obstetrics and Gynecology and of Psychiatry and Psychotherapy, we are investigating the effects of an app- and mindfulness-based program during pregnancy - designed to reduce stress and substance use in the mother - on the one-year-old infant's ability to self-regulate and on broader developmental outcomes in a randomized controlled trial. The study is part of the IMAC-Mind research consortium, which bundles research projects on addiction prevention and addiction therapy in childhood and adolescence throughout Germany.

Funding: Else Kröner-Fresenius-Stiftung, BMBF

Long-term effects of early cardiac surgery on child and adolescent development

PI: A. Eichler

In cooperation with the Department of Pediatric Cardiac Surgery at the University Hospital Erlangen, we study a sample of children who underwent surgery for ventricular septal defect (VSD) before their 3rd birthday and compare them with a non-affected control group. Differences in language development and anxiety symptoms at primary school age (6-9 years) were evident. However, the developmental differences only were present if the mother reported own anxiety symptoms (risk factor) and could be leveled out if the mother showed proactive parenting behavior (protective factor), respectively. Currently, the children are re-surveyed in early adolescence (12-14 years) to answer the question of child developmental trajectories and associated risk and protective factors.

Funding: Deutsche Stiftung für Herzforschung

Multimodal evaluation of therapeutic interventions and treatment success in adolescents with Anorexia nervosa and evaluation of an intervention to reduce body dissatisfaction

PI: S. Horndasch und V. Stonawski

The FRALANA (FRAnconian Longitudinal Study of Anorexia Nervosa in Adolescents) focuses on two aspects to improve the treatment of eating disorders in adolescents: (1) A basic module investigates predictors for successful inpatient treatment of Anorexia nervosa. Somatic, neurobiological, neurophysiological, psychosocial and behavioral parameters will be examined. (2) In the intervention module, an eye tracking based body exposure intervention aimed at the reduction of body dissatisfaction is evaluated. Attentional bias via eye tracking and stress profiles via salivary markers will help to reveal potential underlying mechanisms. Clinical and healthy control groups will be included to investigate disease-specific aspects. The results will help to identify predictors for treatment success and develop novel prevention and intervention programs.

Parental stress in child and adolescent psychiatric care

PI: V. Irlbauer-Müller

Emotional and behavioral problems in children and adolescents are associated with increased parental stress. Parental stress negatively affects parenting behavior, increases the likelihood of dysfunctional parent-child interaction, and thus influences the image the children have of their parents. Our previous research has shown, first, that parents searching for treatment of their children in our clinic exhibit high levels of parental stress and, second, that these levels influence the parental perception and description of child symptomatology. In ongoing studies, we are assessing the effect of parent-centered interventions (including Parent Resource Group and fathers' group) on parental distress and children's parenting perceptions. In a piloted evaluation of our Parent Resource Group developed in 2017, we found evidence of parental stress reduction as well as increased parenting skills in parent-child interactions.

Therapeutic interventions – Clinical effects and underlying mechanisms

PI: O. Kratz

Neurofeedback involves a brain-computer interface which enables to learn self-control over specific aspects of neural (EEG) activity. While our earlier multi-center studies demonstrated the clinical effectiveness of neurofeedback for children with ADHD, our meta-analysis indicated in addition that neurofeedback effects (compared to non-active control treatments) lasted longer after the end of treatment. Our further studies („short-term studies“ with less training session) aimed at how to optimize neurofeedback training and learn more about the mechanisms underlying a successful training („neuroplasticity“).

Special light concepts are used to stabilize circadian rhythms in mental disorders. In our light

laboratory, increased attentional performance under blue vs. red light was observed in healthy adolescents and first indications of improved sleep quality were obtained (actigraphy measures) after red vs. blue light. Evaluation of the efficacy of light exposure in adolescents with clinically relevant emotional and behavioral symptoms are ongoing. The question of feasibility and efficacy of the QTRobot therapy robot for the treatment of child and adolescent psychiatric patients compared to healthy controls in two training conditions (therapist vs. robot) is the subject of our QT-Study. Here, we focus on children aged 6-10 years with autism spectrum disorders and social anxiety. In these patient groups, interpersonal contact with adults and peers is challenging. We are investigating how QTRobot can assist in learning emotional and social skills in a playful and simple way.

Prenatal trauma and fetal programming in a mouse model

PI: Dr. A. Plank

We are investigating the molecular, neuroendocrine and behavioral effects of prenatal trauma in a mouse model. Here, we are particularly interested in temporal aspects and underlying mechanisms of action. Prenatally traumatized pups exhibit reduced body weight, increased anxiety behavior, and increased HPA axis activity. Adult prenatally traumatized animals show altered expression and promoter-methylation of *Crhr1* and *Fkbp5* in the dorsal hippocampus. In summary, our results support the hypothesis that prenatal trauma has long-term effects on neuroendocrine aspects and anxiety behavior through epigenetic mechanisms and altered expression regulation of key stress system genes.

Teaching

The Division of Child and Adolescent Mental Health is involved in compulsory and elective courses in the curriculum of the degree program human medicine, logopedics and psychology. Particularly noteworthy is the creation of patient video recordings - incorporating parent and therapist reports - for student courses (*Hospideo-Project*; funding: BMBF 'QuiS Digitalisierung in der Lehre' & FAU 'Innovationsfonds Lehre').

MD thesis as well as Bachelor's and Master's thesis (mainly in psychology) are supervised.

Selected publications

Eichler, A., Köhler-Jonas, N., Stonawski, V., Purbojo, A., Moll, G. H., Heinrich, H., . . . Kratz, O. (2019). Child neurodevelopment and mental health after surgical ventricular septal defect repair: risk and protective factors. *Dev Med Child Neurol*, 61(2), 152-160. doi:10.1111/dmcn.13992

Grimm, J., Stemmler, M., Golub, Y., Schwenke, E., Goecke, T. W., Fasching, P. A., . . . Eichler, A. (2020). The association between prenatal alcohol consumption and preschool child stress system disturbance. *Dev Psychobiol*
doi:10.1002/dev.22038

Horndasch, S., Oschmann, S., Graap, H., Heinrich, H., Moll, G., & Kratz, O. (2020). Attention towards food: Conflicting mechanisms in anorexia nervosa. *Appetite*, 154, 104800.
doi:10.1016/j.appet.2020.104800

Horndasch S., Roesch, J., Kratz, O., Vogel, A., Heinrich, H., Graap, H., Moll, G.H., Dörfler, A., Forster, C. (2020). Neural mechanisms of perceptive and affective processing of body stimuli

in Anorexia nervosa – are there developmental effects? *Psychiatry Research: Neuroimaging*, 286:112853.

<https://doi.org/10.1016/j.psychres.2020.112853>.

Stonawski, V., Frey, S., Golub, Y., Rohleder, N., Kriebel, J., Goecke, T. W., . . . Eichler, A. (2019). Associations of prenatal depressive symptoms with DNA methylation of HPA axis-related genes and diurnal cortisol profiles in primary school-aged children. *Dev Psychopathol*, 31(2), 419-431.
doi:10.1017/s0954579418000056

Studer, P., Brucker, J. M., Haag, C., Van Doren, J., Moll, G. H., Heinrich, H., & Kratz, O. (2019). Effects of blue- and red-enriched light on attention and sleep in typically developing adolescents. *Physiol Behav*, 199, 11-19.
doi:10.1016/j.physbeh.2018.10.015

International cooperations

Prof. Ciara McCabe, Neuroimaging of Reward Group, University of Reading, School of Psychology and Clinical Language Sciences, Reading, UK,

Dr. Aida Nazarikhoram, LuxAI S.A., Luxemburg, Luxemburg