Universität Basel

Research Project

Socio-emotional development and mental health of preterm children: The role of HPA-axis function, sleep, neuroplasticity, and physical exercise during the transition to adolescence

Third-party funded project

Project title Socio-emotional development and mental health of preterm children: The role of HPA-axis function, sleep, neuroplasticity, and physical exercise during the transition to adolescence
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Background: Preterm children and adolescents show increased rates of socio-emotional difficulties (e.g. behavioral problems) and higher rates of mental health problems (e.g. emotional symptoms) than term born children and adolescents. As preterm birth is increasingly common, it is important to understand processes impeding or facilitating socio-emotional development and mental health of preterm children and adolescents. There is evidence that bio-physiological, neuroendocrine, and behavioral factors including the hypothalamic- pituitary-adrenal axis (HPAA) function, sleep quality, neuronal plasticity (as indicated by levels of brain derived neurotrophic factor; BDNF), and physical exercise play an important role for socio-emotional development and mental health. As adolescence is a developmental period of fundamental psycho-social change and particularly increased risk for the onset of socio-emotional and mental health disturbances, it is a research priority to study risk and protective factors during the transition to adolescence. However, longitudinal research on preterm children studying the role of HPAA-function, sleep, neuroplasticity, and physical exercise during the transition to adolescence is missing.

Objective: We aim at testing the following hypotheses within an interdisciplinary approach.
1) Adolescents born preterm show more socio-emotional difficulties and more mental health problems, altered HPAA-function, lower levels of sleep quality, and lower levels of BDNF compared to controls.
2) Altered HPAA-function, poor sleep, and low levels of BDNF are related with socio-emotional difficulties and mental health problems in adolescence. We expect the relation to be even stronger in preterm born adolescents due to their generally increased vulnerability for behavioral and emotional problems.
3) A high level of physical exercise is positively related to socio-emotional development and mental health during the transition to adolescence. Again, we expect the relation to be even stronger in preterm born adolescents due to their generally increased vulnerability for behavioral and emotional problems. Moreover, we expect high levels of physical exercise to be related with HPAA-function, favorable sleep patterns, and higher levels of BDNF.
Design and Method: The study includes a cohort of very preterm born adolescents (<32nd week of gestation), born in Basel with birth years 6/2001–12/2005, as well as age and gender matched term born controls, who participated on a first measurement wave during childhood (altogether N = 190 children; 96 preterm and 94 full- term children, who were assessed during childhood in an earlier phase of the project). The proposed study comprises one follow-up measurement wave of this sample during early adolescence (ages 12;0 – 14;12 years). The follow-up sample during adolescence is expected to include

n = 75 adolescents born very preterm and n =
75 adolescents born full-term. Planned measurement includes (a) parental and adolescent-report questionnaires (assessing adolescents' socio-emotional development and mental health, physical activity/exercise, as well as parenting behavior and peer relationship quality), (b) paper-based assessment of socio-emotional competence (MSCEIT-YV) and cognitive development (WISC-IV)), (c) interviews with adolescents regarding their mental health (Kinder-DIPS), (d) assessment of adolescents' HPAA-function by saliva samples and hair cortisol, (e) one night of sleep EEG/polysomnographic-assessment, (f) seven nights and days of actigraphy/activity monitoring and sleep diary, (g) blood samples to assess BDNF concentration.
Relevance and impact: The study will provide information on the role of HPAA-function, sleep quality, neuronal plasticity, and physical exercise for socio-emotional development and mental health of preterm children during adolescence. Interventions to improve socio-emotional development and mental health of preterm and full-term born adolescents will profit from the newly generated evidence.

Keywords preterm birth, adolescence, socio-emotional development, mental health, depressive symptoms, HPA-axis function, sleep, BDNF, neuroplasticity, physical exercise, risk and protective factors, resilience
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Follow-up project of 1380069 Sleep, cognitive, and socio-emotional development in preterm children during middle and late childhood

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