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Abstract

Families with Social Burdens and the Cognitive Development and Executive Functions of a Child with Preterm Birth. A Longitudinal Intervention Study

Cognitive development is a process involving a complex interaction between biological and environmental factors. The environment in which the child grows up also determines developmental progressions. Studies have demonstrated associations between socioeconomic status (SES), as measured by maternal education, and poorer cognitive development, language skills, and academic achievement (Benavente-Fernandez et al., 2019, Johnson et al., 2016). It has been shown that preterm children from families with higher SES develop fewer problems later in life than children from low SES families (Benavente-Fernandez et al., 2019, Wong & Edwards, 2013).

Children born prematurely are biologically immature and there is growing consensus that they are at risk of executive deficits and neurodevelopmental difficulties that increases with decreasing gestational age (Blasco, et al., 2020). Executive functions (EF) is an umbrella term for heterogeneous, higher-order cognitive processes that are important for active regulation of thought, emotion and adaptive behavior (Miyake et al., 2000). EF's classical subcomponents are inhibition, shifting and updating (working memory). EF is very sensitive to environmental factors including negative ones such as poverty and positive ones such as sensitive parenting (Valcan et al., 2018).

Research project ZEPPELIN^[1] 0-3 years is one of the largest longitudinal intervention studies in Europe with a randomized controlled trial study design and it is conducted in German-speaking part of Switzerland. The main aim is to study whether early support during first three years has positive impacts on children's development and parents show improved parenting practices in families which have social burdens (N=248 families with 261 children). Further, there is an interest if early support enhances educational opportunities in the future.

Bronfenbrenner's process-person-context-time model, PPCT (Bronfenbrenner & Morris, 2006) forms the theoretical framework and as intervention the Parents as Teachers (PAT) program is used (www.pat-mitelternlernen.org; Lanfranchi & Neuhauser 2013; see more detailed description of intervention in "Methods"). PPCT model posits that the developing child forms a dynamic unit with the environment in which each influences the other. Continuous, reciprocal, and increasingly complex interactions within this unit, so-called proximal processes, are the "primary engines" of development (Bronfenbrenner & Morris, 2006, p. 798). Characteristics of the developing person, the developmental outcome, the environment, and the time period influence these processes. At the core of the model is the child and its biological and psychological resources, with which it shapes its own development. (Bronfenbrenner & Morris, 2006)

ZEPPELIN research project is interested in families which have social burdens and risk factors during the time of birth of the child and families need support with early care and education of their children. Social burdens and risk factors are defined as limited social support, financial distress, unemployment or family difficulties.

The aim of current study is to describe cognitive development and executive functions of preterm and early term children during 0-3 years in families having social burdens. The other aim is to study intervention effects in this population when PAT program is used.

[1] *Zürcher Equity Präventionsprojekt Elternbeteiligung und Integration* [Zurich Equity Prevention Project with Parents' Participation and Integration]

Methods:

This study is based on ZEPPELIN 0-3 research project and the participants (N=89) are withdrawn from ZEPPELIN population (N=261). Premature births have been defined as children born very preterm (Gestational Weeks < 27), preterm (GW 27-33), late preterm (GW 34-36) and early term (GW 37-38).

In ZEPPELIN 0-3 project there are four comprehensive developmental assessments: t_0 : in child's 3rd month of life; t_1 : in 12th month; t_2 : in 24th month, t_3 : in 36th month. The main measurement for this study is Bayley Scales of Infant and Toddler Development (BSID-III,

2005) which is individually administered instrument, designed to evaluate developmental functioning through series of standardized test items. It quantifies cognitive, language and motor skills in children. The majority of multidimensional measures of EF have been developed for older children than toddlers and the situation is even more complicated with preterm and early term children. In this study conclusions from Blasco et al. study (2020) and Lowe et al. (2009a) studies are followed which hypothesized that BSID-III contains items with EF components that could be extrapolated. In addition, a maternal questionnaire of emotional and behavioral problems, a Child Behavior Check List will be used.

Intervention procedure:

In ZEPPELIN study design the families were randomly assigned to two groups: an intervention group receiving the intervention (PAT) and a control group with no intervention. PAT parent-training program aims to increase parental knowledge of early childhood development and the improvement of parental practices. It also aims at early detections of developmental delays and health issues, and the prevention of child abuse and neglect. The long-term aim is to increase children`s school readiness and success.

The families in intervention group received at-home support starting one month after the birth of the child, continuing up to the child`s third birthday. Trained parent educators made home visits in 132 families (N= 53 in this preterm study) every two to three weeks for a period of three years. In addition, group meetings which aimed at building social connections were held monthly at the family center. Control group which did not receive PAT program consist of children in 116 families (N= 36 in preterm study) with social burdens (more detailed description: Lanfranchi & Neuhauser, 2013).

Current study is retrospective, and the analyses will be conducted during autumn 2021.

Conclusions:

Previous studies of research project ZEPPELIN 0-3 have shown that PAT intervention was effective and provided long-lasting developmental support for children in families with social burdens. According to Schaub et al. study (2019) the greatest impacts were found in the children`s language skills, cognition, and adaptive behavior and developmental status. According to studies on parenting practices (Neuhauser 2018) positive impacts were mainly associated with stimulating environment at home and mothers receiving PAT support were

significantly more sensitive. In addition, parents in intervention group used social connections more effectively and had better connections with community resources.

Expected outcome of current study:

The prevalence of preterm and early term children has increased rapidly as well as better survival of preterm children (Twilhaar et al., 2018), therefore there is a need to study their cognitive development and EF. Despite the growing population of children born late preterm and early term there is a lack of studies on their neurocognitive development. In addition, there is a need for studies on early interventions which support developmental trajectories, parental practices and environmental factors. Importantly, in this study a longitudinal perspective is emphasized which gives relevance to intervention study and further, solid insight on children's development, and more generally children's educational opportunities.

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