TIME FOR TIME - IN TIME! Assessment of time processing ability (TPA) and daily time management in children with disabilities

The over all aim of this thesis is improving a method for supporting children with difficulties in their daily time management by operationalizing the concepts of time in ICF-CY into an assessment of time for clinic and research and to contribute to the body of knowledge in children with or without time processing difficulties.

Study I: Development of a new assessment of time processing ability for children, using Rasch analysis (published).
The purpose of this study was to examine aspects of construct validity of a new instrument, for assessing time processing ability (TPA) in typically developing (TD) children. Data from 144, 5-10 year-old TD children, was collected with a *multi diciplinary instrument*: **K**it for **a**ssessing **Ti**me processing ability (KaTid), a Parent scale for daily time management and Self-rating of autonomy. Data was analyzed using modern test statistics; Rasch models. A step-by-step procedure was carried out, omitting items that did not fit the model. 51 items in KaTid demonstrated acceptable goodness-of-fit to a Rasch model indicating evidence of internal scale validity. The performances of the children in KaTid demonstrated acceptable goodness-of-fit to the Rasch model indicating evidence of validity in response processes. The items in KaTid separate the children into four different levels of TPA. Relationships between the KaTid measures and the parents' estimations of the child's daily time management indicated further evidence of construct validity.

The results from this study indicate that the items in KaTid, initially defined as time perception, time orientation and time management, all demonstrate acceptable internal scale validity, based on the actual goodness-of-fit statistics used in the analysis and all 51 items support a potential unidimensional construct, here named TPA. In this unidimensional construct time perceptions, time orientation and time management can be seen as different levels of complexity in time processing ability rather than as separate constructs. There is a need for further research in children with disability and TPA.

Study II: Measurement of time processing ability and daily time management in children with disabilities (accepted for publication)
The aim of the second study was to empirically investigate the hypothesized relation between children's TPA, daily time management (TM) and self-rated autonomy. Participants were children aged 6 – 11 years with disabilities: Attention Deficit Hyperactivity Disorder (ADHD), autism/ Asperger syndrome, mild or moderate intellectual disabilities, or with neurological disease like CP or MMC (n=118). TPA was measured with the instrument KaTid, daily TM with a parent scale and Self-rating of autonomy with a short version of a validated scale of autonomy. All data were transformed to interval measures using applications of Rasch models and then further analysed with correlation and regression analysis.

The results demonstrate a moderate significant relation between the parents' ratings of daily TM and the TPA of the children, and between the self-rating of autonomy and TPA. There was also a significant relation between self-ratings of autonomy and the parents' rating of the children's daily TM. Parents' ratings of their children's daily TM could explain 25% of the variation in TPA, age of the children explains 22%, whilst the child's self-rating of autonomy can explain 9% of the variation in TPA. The three variables together explain 38% of the variation in TPA. The results indicate the viability of the instrument for assessing

TPA also in children with disabilities, and that the ability measured by KaTid is relevant for daily time management.

Study III: Patterns of Time Processing Ability in children with and without Disability (submitted)
Children with cognitive disabilities, e.g. ID or autism are reported to have problems in time perception, time orientation or time management, i.e. time processing ability (TPA). It is not known whether the problems described are diagnosis specific or reflect differences in age or in level of TPA. The aim of study III was to investigate if there were different patterns in TPA in children with disabilities and TD children, if there are individual differences in patterns and if such differences were related to type of diagnosis using a person-oriented approach. With a cluster analysis, this study investigated if there were different patterns in TPA in 5 – 10 year-old children with (n=77) and without disabilities (n=89) and whether differences were related to type of diagnosis or chronological age.

The results indicated that four of the five clusters differed mainly in chronological age and in levels of TPA. Children within the same diagnostic category do not share membership in a subgroup with specific pattern of TPA. Daily time management as estimated by the parents and self-rated autonomy differs between clusters and was related to the TPA. Overall the level of TPA seems to be a more valid base for planning interventions in daily time management than type of diagnosis. More research is needed to examine the differences between children with and without disability.

Study IV: Comparing time processing ability in children with or without disability. (Manuscript in progress)
The aim of study IV was to further investigate if there was a difference between the response patterns of children with disability compared to TD children that might indicate bias/differential functioning in items or scale. Participants were children with disabilities, same criteria as in earlier studies (n=144) and TD children (n=115) totally 259 5 – 10 year old children. Data was analysed with Rasch analysis models for differential item functioning (DIF) and Standardized z-comparison. The DIF analysis demonstrated that the two samples responded similarly in 37 of the 51 items (72.5%) in KaTid indicating stability across the samples in these items. The first analysis revealed a difference in challenge in some specific items in KaTid between children with or without disabilities; most of them in the subcategories time perception and time orientation. However, the Standardized z-comparison resulted in a trivial degree of differential functioning at scale level. There were no discernible patterns connected to diagnoses. This study provides evidence of further validity of the KaTid.

There is now an instrument that can be used for valid assessment of a child's individual level of TPA, also change over time, for children with or without disability complemented by the Parent scale for valid assessment of a child's daily TM, useful in clinic and in research. The results of this attempt of operationalizing the concepts of time in ICF-CY indicated that TPA might be one construct, meaning that the skills of time perception – time orientation and time management are different levels of complexity in TPA rather than separate constructs. This thesis including the evaluated instruments, contribute to clarifying the construct and the concepts used, making it possible to unify the language. This can contribute to improve communication used in between the parents and between parents, professionals and significant others. Everybody using the same concepts of time (ICF-CY), opens up for describing present skills in TPA and the daily TM of the child, to set concrete and reachable goals and discuss how to reach the goals all beneficial for the child and family.