

## Modern Technology-Based Methods in Neurorehabilitation for Social Competence Deficit in Children with Acquired Brain Injury

**Authors :** M. Saard, A. Kolk, K. Sepp, L. Pertens, L. Reinart, C. Kööp

**Abstract :** Introduction: Social competence is often impaired in children with acquired brain injury (ABI), but evidence-based rehabilitation for social skills has remained undeveloped. Modern technology-based methods create effective and safe learning environments for pediatric social skills remediation. The aim of the study was to implement our structured model of neuro rehab for socio-cognitive deficit using multitouch-multiuser tabletop (MMT) computer-based platforms and virtual reality (VR) technology. Methods: 40 children aged 8-13 years (yrs) have participated in the pilot study: 30 with ABI -epilepsy, traumatic brain injury and/or tic disorder- and 10 healthy age-matched controls. From the patients, 12 have completed the training (M = 11.10 yrs, SD = 1.543) and 20 are still in training or in the waiting-list group (M = 10.69 yrs, SD = 1.704). All children performed the first individual and paired assessments. For patients, second evaluations were performed after the intervention period. Two interactive applications were implemented into rehabilitation design: Snowflake software on MMT tabletop and NoProblem on DiamondTouch Table (DTT), which allowed paired training (2 children at once). Also, in individual training sessions, HTC Vive VR device was used with VR metaphors of difficult social situations to treat social anxiety and train social skills. Results: At baseline (B) evaluations, patients had higher deficits in executive functions on the BRIEF parents' questionnaire (M = 117, SD = 23.594) compared to healthy controls (M = 22, SD = 18.385). The most impaired components of social competence were emotion recognition, Theory of Mind skills (ToM), cooperation, verbal/non-verbal communication, and pragmatics (Friendship Observation Scale scores only 25-50% out of 100% for patients). In Sentence Completion Task and Spence Anxiety Scale, the patients reported a lack of friends, behavioral problems, bullying in school, and social anxiety. Outcome evaluations: Snowflake on MMT improved executive and cooperation skills and DTT developed communication skills, metacognitive skills, and coping. VR, video modelling and role-plays improved social attention, emotional attitude, gestural behaviors, and decreased social anxiety. NEPSY-II showed improvement in Affect Recognition [B = 7, SD = 5.01 vs outcome (O) = 10, SD = 5.85], Verbal ToM (B = 8, SD = 3.06 vs O = 10, SD = 4.08), Contextual ToM (B = 8, SD = 3.15 vs O = 11, SD = 2.87). ToM Stories test showed an improved understanding of Intentional Lying (B = 7, SD = 2.20 vs O = 10, SD = 0.50), and Sarcasm (B=6, SD = 2.20 vs O = 7, SD = 2.50). Conclusion: Neurorehabilitation based on the Structured Model of Neurorehab for Socio-Cognitive Deficit in children with ABI were effective in social skills remediation. The model helps to understand theoretical connections between components of social competence and modern interactive computerized platforms. We encourage therapists to implement these next-generation devices into the rehabilitation process as MMT and VR interfaces are motivating for children, thus ensuring good compliance. Improving children's social skills is important for their and their families' quality of life and social capital.

**Keywords :** acquired brain injury, children, social skills deficit, technology-based neurorehabilitation

**Conference Title :** ICNR 2019 : International Conference on Neurorehabilitation

**Conference Location :** Copenhagen, Denmark

**Conference Dates :** June 11-12, 2019