

Online assessment, documentation and evaluation tool in early childhood intervention – Pilot study in Slovakia in multisensory therapeutic environments

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Abstract: *The article presents partial results of qualitative research in the effects of therapeutic interventions provided by therapeutic educators in multisensory rooms. The research was focused on exploring how specific components of multisensory environments influence competencies of clients in early childhood intervention. The authors focused on children with multiple disabilities and children on the autism spectrum. They introduce an online assessment, documentation and evaluation tool created by the ICF-Train project that utilizes the International Classification of Functionality, Disability and Health for children and youth (ICF-CY) in direct work with children and families in early childhood intervention.*

Key words: *early childhood intervention, multisensory therapeutic environments, ICF-CY*

1 Introduction

Presented article is based on the praxis of the authors in the area of early childhood intervention with clients with multiple disabilities and with clients with autism spectrum disorders and their families. Interventions were provided in multisensory rooms, with a focus on sensory stimulation, relaxation and integration. The practical experience and qualitative research data were utilized in a pilot study of an online assessment, documentation and evaluation tool developed in the LLP Leonardo da Vinci ICF-Train project (Project number: 2012-1-AT1-LEO05-06975). The ICF-Train project is focused on training of professionals in multidisciplinary teams working in early childhood intervention in applying the ICF-CY coding system in the documentation of their cases, including anamnesis data as well as evaluation of provided interventions.

International Classification of Classification of Functionality, Disability and Health for Children and Youth represents a common communication base of helping professionals in medical, social, and educational sectors working with families. ICF-CY uses a descriptive, non-judgmental language. Moreover, the ICF-Train online tool is completely transparent and opens the assessments of professionals towards parents. It invites the parents or caretakers to be partners on the team. Therefore, professionals are taught to use simple and clear explanations. The superior position of experts over the parents is reduced in this way. Also, the coding of ICF-CY is only descriptive. It is not a diagnostic tool. It serves an instrument of documenting the assessments. The aim using ICF-CY lies in precise and condensed transfer of observed, assessed and discussed information about the client. The qualitative data is coded by a common classification, which allows further research of the observed phenomena, comparisons in time, evaluations of provided therapeutic and supportive interventions, or supplementing opinions of different experts.

Therefore, the authors used the ICF-Train online tool as a means to record and further assess the data of qualitative research in multisensory environments. Therapeutic interventions such as concepts of sensory integration (Ayres et al., 2005) or Snoezelen rooms (Ponechalová & Lištiaková, 2010; Stražilová & Lucká 2011) are not highly structured. They rely on effects of prepared environment and a free choice of activities by the clients. Such non-directive approach means that it is difficult to evaluate the benefits of these interventions. ICF-CY coding system provides a simple tool of categorizing observed behaviours and changes in clients' reactions, emotions, participation and overall supported competencies.

The goal of this article is to present the results of a pilot study that applied the ICF-CY coding and used the online documentation tool as a method of categorizing qualitative data from observations of clients during early childhood intervention programmes for children with disabilities. The theoretical part of the article describes the principles and background of multisensory therapeutic approaches with the focus on perception and its disorders. The research part attends to partial results of qualitative inquiry into the effects of components of multisensory rooms on clients with multiple disabilities and clients on the autism spectrum.

2 Perception in the context of competencies

The main focus of interventions in multisensory environments is activation of communication and interaction in the physical world and social relationships. In this regard, it is important to focus on supporting responsibilities. Competence according to OECD (2005) includes skills and attitudes. It also argues that the core competencies must *“include valid implications for groups and individuals, assist individuals to*

meet the requirements of wide variations, be important not only for professionals, but for all individuals” (p. 4). Core competencies, according to OECD (2005) are divided into three categories: conversational skills (pragmatic language level), interactions in heterogeneous groups, and autonomous procedures. The acquisition of conversational competence in the usage of language, symbols and text interactively is called a conversational competence. Williams (2011) stated that people with disabilities have the right to be engaged in the communication process and the right to speak and to express themselves outwardly. According to Tedder, Warden and Sikka (1993), communication is dependent on the interpretations of the recipients and their ability to decode the characters transmitted to them. Communication, especially in the case of people with autism, or with severe multiple disabilities, has its own specifics. Development of language often remains only on an instinctive level. Mainly, if the speech impairment is more severe, it also causes difficulties with non-verbal expression. One of the basic prerequisites for the success of interventions is preparedness of the expert to be in the communication process, to be able to seek ways of communication and to decrypt it. Pavlis (2010) outlined some of the barriers to communication that can occur. They include cognitive and sensory barriers, deficiencies in motor and emotional/volition area, permeable sensory channels, processing and storage apparatus, and last but not least expression. For this reason, it is often necessary to focus on alternative or augmentative form of communication. Janovcová (2004) considered as most appropriate alternative forms of communication basal stimulation, when communication of clients is on a basic (basal) level, and allows connection with people who have a problem with sensory integration. Another key competence is interaction in group. Therefore, it is important to support perception and processing of sensory stimuli as a part of supporting competencies in general.

Perception is a complex phenomenon consisting of sensations, such as visual, auditory, tactile, vestibular, proprioceptive stimuli, and their processing (Goldstein, 1984). Perception enables to navigate in the environment and to create an idea of it (Čapáková & Kováčová, 2014). Ayres et al. (2005) described the function of brain to process stimuli in an adaptive way as sensory integration. It is necessary for effective behaviour in the environment. Visual and auditory systems process stimuli that do not necessarily need to be in a close proximity to the body. They are called tele-receptors (Ayres et al., 2005). They are often addressed when talking about academic skills support. In enhancing development in early childhood intervention, it is important to focus on the connection of visual and auditory stimulation with more basal sensory system that create the platform for development of higher functions. Vestibular perception is responsible for gathering information about position and movement of the body. It is provided by the semi-circular canals of the inner ear that react to gravity. It is activated by movements of the head and its position in relation to the ground (Bundy et al., 2002). It affects static and kinaesthetic balance – staying

still and walking, or movement in general. It is also a part of nonverbal communication, which shows emotions and it is necessary for cognitive development (Abraham, 2002). Through tactile system, feeling of pressure, vibration, temperature or pain are gathered by receptors in skin and then further processed (Kranowitz, 2005). Tactile system represents surface perception of the body that is closely connected with building relationships and intimacy. Lack of tactile stimuli can lead to sensory and also emotional deprivation, which is connected to the theory of attachment (Bowlby, 2005). Touch is important for learning about objects, but also about the body itself. If tactile information is not precise, it can hinder body coordination and movement (Abraham, 2002). Tactile discrimination describes the ability to differentiate between particular tactile stimuli, awareness of touching and being touched, differentiation of shape and form of objects, temperature, or surface (Kranowitz, 2005). Another system called proprioceptive perception represents information from the inside of the body through muscles and bones. It creates awareness of the body schema and oneself. Thanks to proprioceptive systems, conducting and controlling movements without thinking about them is possible (Kranowitz, 2005). Also, being aware of the position of different body parts relies on proprioception (Friedlová, 2011). Integrated with visual, tactile and vestibular control, it helps in motor planning. It precedes fine motor skills and it is responsible for generalization of movements (Harms & Mariano, 2003). In order to perform an intentional action connected with movement, such as sitting down on a chair, or grabbing a glass of water, it is necessary for the sensory systems to be connected and the information to be processed together. Then it is possible to react adaptively to the environment. Adaptive response according to Ayres et al. (2005) means a meaningful and situation appropriate behaviour, for example judging the position of the chair correctly, sitting down with accurate speed and without looking at the chair. Academic skills are even more complicated and require highly developed sensory integration. Looking at the board, and then redirecting the head towards paper and pen, writing while constantly looking up and down, at the same time, keeping the body still on a chair, listening to the teacher and responding are only some examples of complex actions.

3 Sensory Processing Disorders

Children with learning disabilities, attention deficit and hyperactivity, autism spectrum disorders, or mental retardation may have issues in sensory processing. These can be observed and addresses in early childhood intervention. Kranowitz (2005) mentioned several categories of sensory processing disorders affecting areas of (a) modulation, (b) discrimination, and (c) motor skills. When modulation of sensory stimuli is affected, people feel the sensations are stronger (hypersensitivity) or they

do not feel them enough (hyposensitivity). A separate category constitutes of sensory craving which signifies a search for a certain type of stimuli. Hyper- and hyposensitivity, as well as sensory craving can be present in any of the sensory modalities.

Hypersensitivity in visual system can be observed for example when people avoid light. Hyposensitivity seems to be more common in children with autism, since they flicker their fingers in front of their faces for a sensory stimulation. In the area of auditory stimuli, hypersensitivity is often visible from behaviours such as covering ears and screaming in order to cover other sounds coming from the environment. Hyposensitivity can be seen when children do not react to certain sound frequencies. We can assume that tactile system is affected when children hate wearing clothes, cannot stand certain textures of clothing, materials or food, also when a soft touch of another person is perceived as painful. On the contrary, some people do not feel touch, which might be dangerous in some situations and can also influence their social relationships. Proprioceptive system is highly connected with tactile system, but it is focused more on feeling the body as a whole, with the perception of body schema. Children that throw themselves on the ground, push against other people or relax under heavy mattresses are likely to be in need for strong proprioceptive stimuli. Vestibular system might be hypersensitive for example when people cannot bear changes of position of the body, or are afraid of walking on uneven surfaces. Hyposensitivity may be present in case of craving trampoline jumping, roller-coaster rides, swinging, or spinning.

Disorders in modulation described above may be accompanied with discrimination issues. In this type of sensory processing disorder, people are unable to differentiate parts from the whole, or distinguish between stimuli. Capáková and Kováčová (2014) pay particular attention to the promotion of visual perception of children as a preventative action. In visual systems, this is often present in case of dyslexia, when people cannot spot differences between similar visual information, such as orientation of letters. In auditory system, children with differentiation problems cannot focus because it is difficult for them to choose the right sounds to listen to. They perceive the environment as too chaotic. Similarly, in the area of tactile information, touch of clothing on the body may distract from touching a toy for example. Proprioception may be affected when children have difficulties identifying body parts without looking at them. Vestibular system is connected with kinesthesia in space, so children might have a hard time navigating through space.

The third type of sensory processing disorder is caused by a lack of integration of various sensory systems and it is connected with motor skills. It can be either a postural disorder or dyspraxia (Kranowitz, 2005).

According to Pagliano (2001), multisensory environment establishes especially suitable conditions for assessment because it allows professionals to observe children in stimulating surroundings. Early childhood intervention in multisensory environ-

ments is based on the theory of plasticity of the nervous system. Changes of plasticity in the nervous system are referred to two groups of changes – the first one is adaptation (adaptation to changes in the environment) and the second one is the rate of onset of these changes. A lack of incentives for the nervous system means that its functions cannot develop and differentiate adequately. As described by Friedlová (2007), in this case, there is a risk of secondary damage to the central nervous system. According to the neurophysiological model of developmental plasticity, in addition to identity, also trophic functions are important (Langmeier & Krejčířová, 1998). Based on these arguments, it is necessary to obtain a certain number of incentives inevitable for activation of the central nervous system.

Providing appropriate stimuli from the outside contributes to building neural connections and thus promotes improvement in participation in life and generally, higher quality of life of people with disabilities. Stimulation happens through prepared safe environment that triggers reactions of children with developmental delays. In this way, multisensory environments offer the surroundings for children to follow and fulfil their developmental needs. As well as in Montessori theory (1972), multisensory environments follow natural development and support it by created conditions. In prepared stimulating environment children naturally seek sensory-motor activities that they need most for their next developmental step, so they are in the zone of proximal development (Vygotsky & Cole, 1978). The environment offers a challenge but it is manageable so children can experience a feeling of success and empowerment. All the senses are stimulated and children have a chance to explore and feel the impact of their individual actions.

4 Purpose of using multisensory environments

The usage of multisensory environments in early childhood intervention is quite broad. Children with intellectual disabilities, multiple disabilities, or autism spectrum disorders can benefit from its relaxing and stimulating elements (Ponechalová & Lištiaková, 2010). In case of children with challenges in specific areas of development, particular components can be used individually or in combination (Lucká & Stražilová, 2011). In multisensory therapy, providing atmosphere that is pleasant for the client represents a crucial principle. Through the means of sound, light, smell and touch, clients are given an opportunity for living experiences they do not meet in everyday life due to their disabilities. Friedlová (2011) mentioned that the goals of multisensory interventions are set individually for each client based on their particular issues. Multisensory environments are also suitable for using the techniques of basal stimulation since they offer stimuli similar to prenatal development in the womb. They facilitate body awareness and orientation in the environment. Friedlová

(2007) argued that in addition to communication and perception of movement, it is a pure communication channel with a person who has a disability. Szabová (1998) defined the “*autonomous self*” as a way that people perceive their body, their body borders on another level (p. 19). An important role here plays the experience people have of their own body in their social interactions with the environment. All this is reflected in the physical survival of a person. Identical stimulus does not induce identical physical reaction in different people. The body is essential for communication.

Social competencies express relations of people to their surroundings and interpersonal relationships. Bolton (1986) argued that functions of social interaction separate people from other forms of life. Social competencies are therefore closely linked to communication competence. A prerequisite for a successful implementation of interactions is a constant practice. And this is possible to achieve using multisensory environment.

Defined competencies are essential for people with autism or multiple disabilities. They need to develop the interaction that is commonly used in the society and is related to human needs, possibilities and capabilities. For the acquisition of these competencies, particular children in their individualities stand in the centre of the early childhood intervention network. Important parts of the support include interpersonal relationships coming from the support of experts, and from the support of the family. In case of people with difficulties in sensory integration, such as children on the autism spectrum or children with multiple disabilities, also the use of multisensory environments is highly useful.

5 Research Methodology

Based on the theoretical background of above described sensory integration theory (Ayres et al., 2005), basal stimulation theory (Friedlová, 2007; Friedlová, 2011), and the professional background of the authors as therapeutic pedagogues providing early childhood intervention, we present research observations carried out in multisensory rooms with clients with autism spectrum disorders and clients with multiple disabilities.

Multisensory environments are structured into a few types of multisensory rooms with different components and therefore different therapeutic goals. White rooms are used for relaxation and dark rooms for activation (Lucká & Strašilová, 2011). Adventure or playful rooms are generally targeted towards gross motor skill stimulation (Ponechalová & Lištiaková, 2010). In our research we focused on capturing the impact of the multisensory environments on clients in early childhood intervention and on exploring the effect of particular components of these environments on clients. The research was conducted in two different settings: (a) a white multisensory

room and an adventure room in a centre for children with autism spectrum disorders, (b) a white room and a dark room in an institution of social care for people with multiple disabilities. Observations were carried out over a period of one year, during regular sessions with clients attending early childhood intervention programmes in these settings. Participants of the research were children between 3–9 years old with developmental delays, autism spectrum disorders or multiple disabilities, with the informed consent of their parents. Some of the parents were present during the intervention.

Research data obtained from observation records were processed using the ICF-CY coding system in the online tool of ICF-Train project (Pretis & Stadler, 2013; Pretis, 2014). This online tool allows full documentation of client anamnesis data, including information about the family and their concerns about the child's development. Professionals can enter assessment observations and code these with the ICF-CY codes. After that, the coded areas of development are considered to be either strengths or risks and marked as such. This allows the next step of planning intervention goals and proposing appropriate therapeutic or supportive strategies. It is based on the idea that the goals in general need to reflect the needs of the child and their possible levels of competencies. The goal is derived from the risk area, but the fulfilment of the goal (in our case, the early intervention strategies) relies on the strengths observed and coded in the previous part. Therefore we can exhibit our reasoning for the selection of therapeutic methods. The system uses a scheme of: If we provide certain intervention, the child will achieve certain goals, because the strengths in the family system or in the child are such and such. After setting these general goals, we set smaller goals in each area in the need of support. These goals are discussed together with parents and they follow SMART criteria (specific, measurable, attainable, realistic and time-limited). It is possible to document all intervention observations in the online tool and to use the ICF-CY codes to track changes in child's development.

6 Research Results

In this article, we present partial results of the qualitative part of our research, organized into two longer vignettes and several small excerpts. The vignettes describe behaviour, bodily and emotional reactions of the client to the multisensory room and offered activities. In vignette nr.1 (V1), we described a client with autism and in vignette nr. 2 (V2), we described a client with multiple disabilities. Vignettes 1 and 2 are coded with the ICF-CY codes. For clarity we list the names of the codes on the bottom of the vignettes.

V1: David is six years old. He has been diagnosed with autism and mental retardation. He does not speak. He is hypoactive (d429) with low muscle tone (b735). He walks when holding hands with an adult (b2351). He is not able to stand up on his own (b7306). He crawls with moving one side of the body and then sitting back on his bottom (b7601). The goal of the therapeutic intervention is to motivate him towards independent movement activities. His mother uses a hyper-protective strategy (e410) and catches him before he falls down. David thus does not have any idea of the impact of his actions and does not have enough experience with his body in the environment, for example when walking on a low gym bench, he does not realize he needs to place his feet on the bench in order not to fall down. In the sensory integration therapy room, his eyes are wide open looking at the therapist in search for understanding when a new activity (d1601) such as slow spinning in a funnel or swinging on a four-point swing is introduced. As he learns with repetition of the activity that he does not need to be afraid (d2500), his eyes do not focus on the therapist. He stays where she put him. David is on the four-point swing, lying on his stomach (d4150). The therapist pulls him forward so that his head and his arms are in the air. She lies down on the floor under the swing. She moves the swing and every time David can see her, she says "cuckoo". David loudly laughs when their eyes meet. She takes David's hands and tries to push at his palms pretending to push away from him to move the swing. David is not able to push away (d4451) but he understood that he is supposed to stretch his arms towards the therapist.

V2: Michaela is six years old. Her diagnosis is a multiple disability – specific combination of physical and mental disabilities. Communication is realized in the form of alternative – winking eyes (d350). Michaela does not have enough motivation to cooperate in the intervention process (b130). Her family interaction is limited to the fulfilment of basic needs (e310, d760). Her mother says that the therapist tried everything, but she does not know how the actions that endure her attention could be sustained for a longer time. Because of a problem with movement and perception of body boundaries (b156, b147), she often strikes when waving her arms (b176), and passing through narrow passages. She responds to intense stimuli, and then keeps attention for a longer time (b140, d160). When Michaela entered the multisensory environment, she looked surprised (b114). After placing her on the music waterbed (b156), initially, she perceived only volatility of the body. After turning on the music and spreading the vibration, first, the body stretched and after a while it completely released (b147). Impressed by watching how the therapist moved the bed, her body lifted sharply, and she exhaled air from her mouth (b140, b152). She was focused on the activity (b140). The therapist responded by words, Michaela communicates on an alternative level (d350). When the therapist brought optical fibres, she followed them first by sight and touched them (b140, b156, d160). She observed as the therapist passed fibres through the body that surrounded it. Subsequently, she stretched towards optical fibres (b760, d445), the therapist inserted them into her hands and she explored them with concentration (d315, b156, b210).

List of codes used according to ICF-CY (WHO, 2001):

- b114 Orientation functions
- b130 Energy and drive functions
- b140 Attention functions
- b147 Psychomotor functions
- b152 Emotional functions
- b156 Perceptual functions
- b176 Mental function of sequencing complex movements
- b2351 Vestibular function of balance
- b7306 Power of all muscles of the body
- b735 Muscle tone functions
- b760 Control of voluntary movement functions
- b7601 Control of complex voluntary movements
- d160 Focusing attention
- d1601 Focusing attention to changes in the environment
- d210 Seeing functions
- d2500 Accepting novelty
- d315 Communicating with – receiving – non-verbal messages
- d350 Conversation
- d4150 Maintaining a lying position
- d429 Changing and maintaining body position, other specified or unspecified
- d445 Hand and arm use
- d4451 Pushing
- d760 Family relationships
- e310 Immediate family
- e410 Individual attitudes of immediate family members

7 Interpretation of Results

In behaviour of children, parents and professionals can observe specific patterns connected with sensory perception preferences and issues. These behaviours are often registered as inappropriate in situations when they occur. For example, throwing oneself on the ground, pushing other children with great power, taking off clothes, avoiding certain materials, shouting or making sounds, flickering fingers in front of eyes, rocking, smelling or touching other people and materials. It can be explained through sensory craving, under- or over-responsiveness in vestibular, proprioceptive, tactile, visual or auditory system. Early intervention strategies include exploring and fulfilling sensory needs in a safe space.

V1: Multisensory room created the environment for meaningful interaction of the therapist with the child with autism. Regarding sensory integration, vestibular stimulation on the swing was connected with visual and auditory stimuli, allowing a complex perception. The environment offered unusual and therefore interesting and motivating materials for the child. A hypoactive child, such as David, can get use out of materials that do a part of the work instead of him, such as swings, slides, or rolling cylinders. The presence of the therapist is also important to create the connections between the child and the materials and to offer a safety of the relationship in a new environment. During the sessions, David's mother was present and she was pleased to see that her son is able to react and to do things on his own, which is an important aspect in early childhood intervention. From the perspective of ICF-CY, the focus on body functions (b-codes) was considered important in the case of this child. Also, we can assume that because of the observer and researcher being a therapeutic educator, attention was brought to the area of participation and activities (d-codes).

V2: Multisensory rooms and their components are suitable for fulfilling the need for intensive stimuli found in Michaela. Focusing simultaneously on multiple senses at the same time allows integration and grounding in the environment. Multisensory environment is suitable for the implementation of interventions directed towards progress of this client with multiple disabilities. Due to strong stimuli in this environment, she could maintain focus for longer periods so that work and intervention was not exhausting for her. As a helpful tool we considered the possibility to describe situations with multiple codes in the online system. It was necessary especially in categories assessing body functions (b-codes) and at the same time the data expressed abilities of the client to participate actively in the intervention (d-codes).

8 Conclusion

Multisensory rooms can be adjusted according to the needs of different client groups. In multisensory rooms, clients can explore and experience themselves in interaction with other people and the physical world. They are useful for hypo-active children because they stimulate reactions and they are also used for hyper-active children in order to eliminate stimulation and promote relaxation. In our research, we explored the effects of components of multisensory rooms on observable behaviour of children with autism spectrum disorders and children with severe multiple disabilities in early childhood intervention. As the main effects of multisensory rooms, we consider: activation and motivation of passive clients, gaining interest and prolonged focus of attention of clients with low participation, creating means of expression and communication for clients with difficulties in spoken language and social interactions, sensory-motor and psycho-motor skills support.

The ICF-Train online tool allowed us to document qualitative data through the ICF-CY codes and therefore they may serve for future comparisons of changes over a longer period of time of providing multisensory interventions. The transparency of the online tool towards parents constitutes also an important component of professional early intervention services. Parents are able to look at the documentation of services offered for their child and therefore become a part of the multidisciplinary team. ICF-CY codes are non-judgemental and understandable. The goals follow small steps and are very particular. The online tool thus creates a base of a partnership of professionals and families in early childhood intervention. This pilot study constitutes a beginning of a thorough research plan focused on exploring all the functionalities of the ICF-Train online tool.

9 References

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