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## **Hudobné aktivity v rozvíjaní kognitívnych procesov (pozornosti) v rámci včasnej intervencie**

### **Musical Activities in the Development of Cognitive Processes (Attention) in Children in Early Childhood Intervention**

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#### **Abstract**

The perception of music requires focus on what is happening here and now. When working with children with developmental issues, it is important to modulate stimuli, so they are strong enough to attract and sustain their attention, despite any limitations. In musical activities, the children follow and respond to the musical movement that occurs within various changes in pitch, melody, intensity, rhythm, timbre, etc. Through these changes, it is possible to regulate the level of attention span. Different musical activities can be implemented into various educational and intervention strategies according to the children's interests as well as their specific needs. The aim of this paper is to present music as an attractive and effective medium to improve children's attention.

**Keywords:** Attention. Attention training. Musical components. Musical activities. Early intervention.

#### **Introduction**

The basic condition of the central nervous system (CNS) for perception and interaction with the environment is vigilance. This state of alertness enables a person to respond to changes in their environment (Havlíček, Voldřich, 2017). It is necessary for the brain to be ready to perceive, process, and react to the coming information. To fulfill this goal, the activity of receptors and the peripheral nervous system is also needed, owing to which information is registered and delivered to the relevant centers in the brain.

Before birth and shortly after birth, children respond to different stimuli primarily by automatic answers and reactions, which are called reflexes. Gradually, thanks to the interaction between the maturation of the nervous system and learning, these reflexive (subcortical) responses are replaced by conscious and deliberate (cortical) behavioral control (Vágnerová, 2005).

Newborns and infants are fully dependent on their caregivers to provide for their needs, as well as for their appropriate stimulation. Their dependence may last longer or be stronger in case of impairment or developmental delays. In this context, Mitašíková (2021) points to several areas of early childhood intervention that need to be considered in helping children work toward meeting their developmental milestones:

- appropriate stimulation, providing stimuli that are strong enough and usable for the child (sensory stimuli are crucial in early childhood development),
- environment, to be sufficiently stimulating but at the same time not disturbing,
- educational strategies, to promote perception and the development of intelligence,
- importance of key relationships and their roles in this process (Mitašíková, 2021).

Due to the interaction of all these factors, children gradually gain control over themselves and their reactions, and learn to respond meaningfully to stimuli from their environment. This contributes to their autonomy and independence.

## **Attention**

The brain is constantly active. It permanently maps the internal and external environment and evaluates the received information in terms of its significance and interest (Medina, 2012). From the many stimuli that constantly affect the child, they perceive only something. This factor that determines the selective focus of consciousness is called attention (Nakonečný, 1998). Thus, attention provides certain limitations in the scope of consciousness, when the brain concentrates on those stimuli that it evaluates as important and at the same time suppresses the perception of those which are evaluated as irrelevant. In addition to the real objects perceived by the senses, attention can also be paid to thoughts and ideas.

Attention itself has no content, but is functionally connected with all mental processes, with perception, but also with emotions and thinking (Nakonečný, 1998). For this reason, Vágnerová refers to attention as a very sensitive indicator of the functional state of the brain (Vágnerová, 2001). Its disorders negatively affect the development of other cognitive processes, and thus the child's ability to become acquainted with the environment that surrounds them, to gain experience, and to learn.

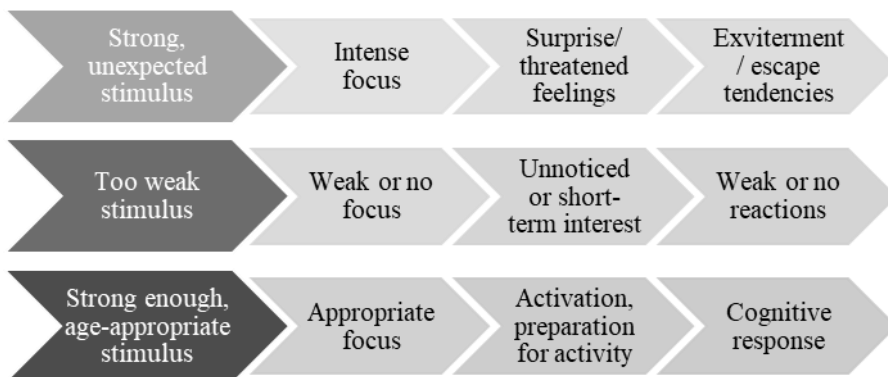
Continuing process of learning and maturation of the CNS occurs in relation to other physical and mental factors (Vágnerová, 2005). While maturation is a biologically conditioned process, for learning and gaining experiences, interpersonal relationships, and the child's interaction with the environment are needed (Kováčová, 2014).

The importance of interpersonal relationships, and especially the mindful presence of key caregiver (mostly mother), is indisputable in early childhood. It is through 'their people' that the child acquires their first experience with the outside world. A mindful presence refers to an approach of parents and caregivers in which they tune into the child's feelings, observe their expressions, and respond empathetically to their needs. Thanks to this closeness, the child can experience a "*continuity of positive experiences*" and gain confidence that the world they are approaching is a safe place (Janoško, 2020). At the same time, this mindful monitoring and evaluating of the child's reactions helps to adapt and regulate the offer of stimuli (their possible strengthening or weakening), and thus contributes to sustaining their attention.

Together with interpersonal relationships, there is another important condition for learning. It is the child's interaction with the environment that is the source of many stimuli which should come in reasonable quantity and quality (Matejček, 2005). Sufficiently strong and age-appropriate stimuli attract the child's attention and prepare them for activity.

Memory also plays an important role, which has an impact on what the child will pay attention to (Medina, 2012). Based on their previous experience, the child evaluates individual stimuli as safe/dangerous, interesting/boring, bringing satisfaction to some of their needs, etc. In addition, different environments create various expectations. Stimuli that permanently surround the child occupy their attention only minimally and elicit weak or no reactions. However, if the child is disturbed by something sudden, unexpected, or unknown, they may experience excitement or a feeling of danger as a result. In such a case, it leads to immediate full attention as they try to identify the source of it. If they evaluate it as safe, they either calm down and return to the activities they have been doing before or shift their focus to the interesting new stimuli.

*Scheme 1: The relationship between stimulus force, attention focus, and response*



For this reason, it is necessary to choose stimuli that:

- the child can perceive at their developmental level,
- which are captivating and attractive,
- which can be partially changed and thus contribute to maintain concentration.

One such stimulus can be music.

### **Children's attention in the context of musical development**

The improvement of attention is developmentally conditioned. It depends on the maturity and integration of many functions and areas of the CNS as well as on the coordination of their activation and inhibition (Vágnerová, 2001). Therefore, the ability to focus and sustain attention is only gradually extended.

After birth, newborns are able to perceive sounds, but out of all the stimuli, they prefer those that are perceived by gustatory, olfactory, somatic (touch, pain, warmth), and vestibular (changes in position) senses. One of the ways mothers meet the needs of their children is by singing lullabies, which often calms the baby. Especially for young children, more important than singing itself is the connection of the spoken word (singing) with touch and maternal proximity. By taking care of the child, the mother naturally conveys many sensory stimuli through feeding, touching, caring, rocking, and talking to the child. As the child progresses, they become more active. When they are already able to fix their eyes and maintain appropriate eye contact with their mother, this eye-to-eye contact becomes a recognizable manifestation that the child perceives the mother and pays attention to her. So, sight and its fixation, or distraction, become one of the observable manifestations that provide information about whether the child is attentive, inattentive, or even uncomfortable.

Gradually, due to the growing interest in sounds (with the onset of auditory dominance in the third month of life, Krbat'a, 2008), they also show an increasing interest in sounds coming from the outside environment. If they are interested, they listen intently. It is also manifested in their reactions (excitement, deep breathing, turning his head behind the sound source, etc.). They also learn to take the initiative and draw the mother's attention to themselves, or to the stimuli from the environment in which they are interested.

With the onset of vocalization, the child begins to express themselves through the voice. Such vocalization can be spontaneous, but it can also be realized in interaction with a close person. If it is within a dialogue between a mother and child, it is the mother who adapts her vocal production to the child. In such a situation it is evident, that the child and mother pay full attention to each other.

At about the age of 6 months, a child starts to respond to music by movement of their body (with rhythmic swaying and rocking, Moog, 1976). Gradually, as they can use their hands purposefully, they show an increasing interest in manipulating various objects in a targeted way. And as they begin to understand the concept of cause and effect, they may be attracted by toys and instruments that, for example, make sound.

With the onset of independent mobility, the child can move and discover interesting things in their environment on their own.

In coming years, they progress in all areas – physically, mentally, intellectually, emotionally, socially. With the development of motor skills and interest in other people, the child like to engage in various musical games and activities.

There are three components of attention that are necessary for children to be able to adequately perceive and redirect their attention to those objects that are currently evaluated as important. These components are (Pattern, Watson, 2011):

- Orienting attention – initial adjustment toward a stimulus (focusing),
- sustaining attention – ability to maintain attention to stimulus,
- shifting attention – disengaging from one stimulus and reorienting to another.

Impairments in any of these may cause potential difficulties in gaining experience, learning, and adapting to external requirements. These problems may manifest as inattention, impulsivity, hyperactivity, or even a combination of these. In a case of inattention, children have a weak perception of incoming stimuli or cannot sustain attention during the activity. In the case of hyperactivity or impulsivity, children perceive the stimuli well, but are unable to select and stick to what is important. They constantly shift attention from one object to another and react to everything that is happening around them.

In a musically based intervention, it is appropriate to promote attention in young children in the way that mimics the natural development of their musicality.

## **Music and musical movement**

Music is an art that exists within space and time. This means that it takes place in the spatial plane (melody, pitch, intensity, timbre, harmony, tonality, tectonics, dynamics) and also in time (musical rhythm, meter, tempo, phrasing, articulation, Králová, Kantor, 2020). Musical movement is defined by changes in tempo, dynamic changes, gradation, ascending and descending series of tones, pauses, etc. In this context, Droppová (1989, p. 9) states that: *“A musical composition gives you the opportunity to follow it chronologically. It begins, develops, culminates, and resonates. It requires us to follow its “life” with a certain dose of inner activity, concentration, interest and presupposed orientation in the means of expression of music.”*

Children respond to music, in most cases, very naturally, joyfully, and spontaneously. In connection with music-related activities, it is important to consider the duration of auditory stimuli. Sounds cannot be heard for any length of time (Vágnerová, 2009), and for this reason, participation in musical activities is highly dependent on the ability to stay focused and attentive.

At an early age, children can sustain their attention only for a short time. If the stimulus ceases to be interesting or comes to an end, they relatively quickly lose interest or redirect their thoughts to something else. Therefore, it is necessary to modify the inputs of the stimuli, so that they maintain their attractiveness. This attractiveness can be achieved through its different variations. In musical movement, all changes (in dynamics, tempo, volume) can be used to bring excitement, raise expectations, but also surprise, and thus help to sustain attention and maintain concentration on performing tasks.

### **Promoting attention through music**

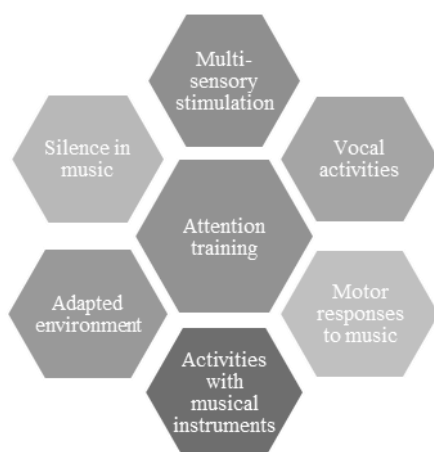
In early childhood intervention, therapeutic objectives are most often focused on supporting the child's development, reducing undesirable symptoms of illness or disability, promoting strengths, supporting social inclusion, etc. At the same time child's family is also subject to the early intervention.

Attention deficits negatively affect the overall development of the child and his ability to participate in everyday life. It is linked to every conscious intention of the child. The objective of the intervention in this area is to arouse interest, encourage participation, and endurance in the offered activities. It is also good to train self-regulation skills within attention training. It helps children to remain focused, attentive, and more effective in completing goals. Through it, children learn to focus on activities in a targeted and deliberate way and, at the same time, not to get disturbed by the stimuli that distract them from performing tasks (Vodičková, 2016). When evaluating children's responses to offered activities it is also necessary to take into account that the child's reactions may be delayed or relatively insignificant (Schwartz, 2008). It is important to meet children where they are and to enable them to reach goals, that are achievable.

Attention training can thus be implemented in a framework using:

- multisensory stimulation,
- vocal activities,
- motor responses to music,
- activities with musical instruments,
- adapted environment,
- silence in music.

*Scheme 2: Framework for the attention training program through musical activities*



### **Multisensory stimulation**

The primary sense involved in the perception of sounds and music is hearing. Throughout development, it is naturally supported by multisensory perception and interconnection of selected sensory modalities (e.g., when locating sounds by hearing, sight plays an important strengthening function, Nakonečný 1998). Along with sight, other sensory systems, such as tactile, kinesthetic, and proprioceptive, are also often involved in mediating the musical experience within musical activities.

This kind of enrichment that engages various sensory modalities might help to reach the child through other channels and to use them to keep them interested. The choice depends on the individual preferences of the child or on an intervention plan that is based on their specific needs.

### **Vocal activities**

Children's vocal activities are most often associated with singing songs. The newborns prefer the mother's voice over the others. They gradually become familiar with often repeated songs and show their interest through visual contact, expressions of joy, and vocalization. As soon as they gain control over their body and learn to use their voice intently, they engage in songs with movement, imitating gestures, by adding words to the lyrics until they can reproduce whole songs on their own.

When promoting attention, it is possible to vary the singing in different ways – e.g., by changing timbre, pitch, tempo (fast/slow), dynamics (quiet/loud), using gradation, instrumental accompaniment, etc. Older children can identify

changes in the melody or lyrics of familiar songs and respond to selected words in an agreed manner.

At preschool age, it is possible to use echo games and various relay techniques which are often performed within a group of children. Joint activities are often governed by clearly defined rules that guide the course of the game. Adherence to these rules can be challenging for children with attention difficulties. Especially if children are easily distracted. Precisely defined rules and organization of games meet their need for structure and routine (Betker, 2017). Children can learn to wait for their turn and guide their actions based on the requirements arising from the game itself.

Through these techniques, it is also possible to practice self-regulation skills and memory.

### **Motor responses to music**

Children naturally respond by moving to stimuli that they perceive and that capture their attention (they fix their eyes, turn to an interesting object, try to reach it, etc.). At the age of six months, they respond with movement to the music they hear. This presence of a motor response is an important indicator that children perceive music and are interested in it.

Gradually, as they learn to control their movements consciously, they engage in activities with gestures and dancing. Enriching activities with movement increases their attractiveness. Children like to join in action songs, simple dances through which they can also improve their motor skills, coordination, following instructions, etc. The rhythm and melodies become part of simple musical and movement games. They provide another option for attention training through musical signals. These significant sound cues (for instance, drum beat) are usually part of the ongoing activity/game, as a result of which the course of the game is changed or is diverted in another direction according to pre-agreed rules (Mátejová, Mašura, 1992). Music can also be used within breaks in situations that require higher concentration. For this movement breaks it is possible to use well-mastered songs accompanied by movements which may serve as pleasant activities for relief and abreaction.

### **Activities with musical instruments**

In the first years of life, cognition and learning take place through direct contact with the real world. Children think within presence and get acquainted with what they perceive or what they can manipulate (Vágnerová, 2005). They find it exciting to examine musical toys and instruments.

Musical instruments attract attention both by their sounds and appearance. They can have different shapes, sizes, or be made of interesting materials. Through all this, they convey many sensory experiences while



giving children the opportunity to experiment with sounds in manipulation and play. The original interest and attention paid to visual and tactile qualities of musical instruments is gradually replaced by their functional use. Children may, for example, accompany songs or spoken words and imitate simple rhythmic and melodic patterns with their play. In receptive activities, when listening to an instrumental composition, they can identify changes in melody, tempo, react when he hears an agreed sound (e.g., triangle sound) or a specific musical instrument, etc. Listening to music at approximately 65-75 beats per minute with a steady rhythm and minimal dynamic changes can be used in relaxation exercises. The repeated experience of rhythm and melody soothes children and brings structure and order to their mind.

### **Adapted environment**

One of the conditions for progress in development is providing a stimulating environment. Such an environment should allow the child to move freely and provide the right amount of stimuli to learn, experiment, and explore the world. At the same time, it should be safe and, to some extent, organized.

The various stimuli in the environment should be strong enough to arouse children's attention, despite any sensory limitations. While for some it is good to provide stimuli with a stronger intensity (e.g., in children with hearing impairment), for others (e.g., in children with attention deficit hyperactivity disorder), it is necessary to create such an environment so that their attention is not unnecessarily distracted. Music that is loud, inappropriately selected, or constantly present distracts the child. Young children exposed to sound stimuli often do not yet know how to protect themselves from it, even if its presence bothers them. In addition to a noisy environment, the cause may also be on the child's side, in the case of increased sensitivity to sounds. For this reason, it is necessary to individually and sensitively consider the room setting as well as decorations, the use of colors, background music, etc.

### **Silence in music**

Pauses in music as well as silence in activities are also important for affecting attention. Activities performed in silence have a special atmosphere. And paradoxically, in vocal and instrumental activities, as well as in musical and movement games, silence can even increase inner tension and expectations. Especially if it is unexpected, or if the pause is used as a sudden break in the ongoing activity. Such a change leads to an immediate focus of attention and an effort to find out what is happening, whether and when the song/composition/game will continue. These breaks are all the more effective, the greater the contrast between the musical dynamics, tempo in song/composition and silence is.

## **Musical activities and interpersonal relationships**

Even when all necessary conditions are met, there are children who do not respond adequately to the offer of stimuli mediated by other people. It may be due to a problem in social interaction, which manifests itself by avoiding eye contact, seeking solitude, and inability to adequately engage in activities with others. For instance, children with autism compared to other children show less interest in objects which are held by a person. There are also differences in attention to auditory stimuli as they show less preference for human voices (Pattern, Watson, 2011). In this case, patience, creativity, and initiative on the part of adults are needed. Even here, music can serve as a medium to establish contact. It is possible to use singing instead of speaking, when attracting child's attention. Thanks to its specific color, the voice of the person is a strong individual contribution, through which it passes on something personal and authentic (Fábry Lucká, 2017). Similarly, a musical instrument may act as an intermediate object in creating a relationship (Betker, 2017). The adult reaches toward the child through its sound. Sometimes, even pre-verbal or non-verbal children are able to participate in improvised musical exchanges, which can be similar to vocal exchanges between mothers and babies. In this way, music making may become a non-verbal means of communication and exchanging between children and their parents, that engages them in common experience (Oldfield, 2016). This sharing may help build trust and emotional closeness between children and the people involved and thus prepare better starting points for further intervention.

## **Conclusion**

For many children, listening to music and participating in musical activities and games is very pleasant. If the music is properly chosen, it captures the child's attention and, with its spatio-temporal qualities, keeps them active. Within the activities offered, it can become an effective and pleasant medium by which the child's attention is captured, focused and sustained. The ideas and activities presented can become part of the ordinary routine, as well as targeted intervention aimed at improving children's attention, cognition, learning, and participation in daily life.

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