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STRATEGIES FOR SUPPORTING THE DEVELOPMENT OF MANUAL SKILLS IN PRESCHOOL AND EARLY SCHOOL AGE CHILDREN

ABSTRACT. Wójcik Magdalena, *Strategies for Supporting the Development of Manual Skills in Preschool and Early School Age Children* [Strategie wspomagania rozwoju umiejętności manualnych dzieci w wieku przedszkolnym i wczesnoszkolnym]. *Studia Edukacyjne* no. 63, 2021, Poznań 2021, pp. 169-178. Adam Mickiewicz University Press. ISSN 1233-6688. DOI: 10.14746/se.2021.63.11

The development of fine motor skills in preschool and early school age children is a difficult and long process, and its disturbance may not only lead to serious problems with the process of drawing or writing, but also disrupt the purely academic learning.

That is why it is so important to take into account the overall effects of improving manual skills, the specificity of the child's perceptual and motor functioning at a given stage of development and to respect the key elements of the diagnostic and improvement strategy.

Key words: fine motor abilities and skills, gross motor development, fine motor development, pre-school children, early school age children, manual skills

Introduction

Because the human nervous system is immature at the time of birth, children are expected to grow and develop continually throughout their childhood years. A number of factors combine to influence each child's rate and quality of motor development.¹

Mastering sensorimotor skills is based on three laws of motor development:

¹ L. Kurtz, *Understanding motor skills in children with dyspraxia, ADHD, autism, and other learning disabilities. A guide to improving coordination*, London 2008.

1. Cephalocaudal development – the direction of development from the head to the extremities – first the head area develops (eye movements, any head movements are possible), then the torso (hand and torso movements), and then the lower limbs (walking)

2. Proximal-distal development – the direction of motor development from the centre of the body to the circumference – changes occur from the longitudinal axis of the body to the sides, the muscles located near the spine develop faster, and then the muscles of the upper limbs

3. Elbow-radial development – the development of grasping takes place from the elbow side, so the fingers of the hand acquire efficiency from the little fifth finger to the thumb.²

Motor activity is an important and necessary development stimulus. It allows not only to improve movement, but also stimulates the proper development of children, which is the basis of their health. The preschool age is uniform due to the dominant form of the child's activity, the way of learning about the surrounding reality, but also gaining experience and involuntary, occasional learning.³

Motor skills are divided into gross motor skills and fine motor skills. Gross motor skills are mainly controlled by the large muscles or muscle groups. These muscles are essential to produce a series of movements, like walking, running and jumping. Because these skills incorporate larger body parts and movements, the development of gross motor skills is necessary for proprioception, core stabilization, and body control.⁴ Fine motor skills are mainly conducted by the small muscles or muscle groups, usually the movements performed with the hands such as picking up, drawing, sewing, typing, or touch and hold objects are considered as fine motor movements.⁵ Fine motor skills require coordination of smaller movements between the fingers, hands, and feet for actions such as picking up and grasping small objects (e.g., pincer grasp). These actions involve dexterity in order to manipulate smaller movements and objects. Development of various gross and fine motor skills begins in infancy, and throughout childhood, individuals experience tremendous physical and developmental growth that typically progresses in a predictable sequence as such, tracking of developmental milestones allows for assessment of a child's developmental functioning, and monitoring of motor skills

² M. Matyja, A. Gogola, *Edukacja sensomotoryczna niemowląt*, Katowice 2009.

³ I. Momola, *Poziom zdolności motorycznych dzieci w wieku przedszkolnym*, Antropomotoryka, 2005, 31.

⁴ Piek, Dawson, Smith, Gasson, 2008, as cited in: M. Matheis, J. Estabilo, *Assessment of Fine and Gross Motor Skills in Children*, [in:] *Handbook of Childhood Psychopathology and Developmental Disabilities Assessment*, Eds. M. Matheis, J. Estabilo, California 2018.

⁵ M. Rebelo et al., *Child Motor Development: Relationship between Global and Fine Motor Skills and Age*, *Desarrollo Motor del niño: Relación entre Habilidades Motoras Globales, Habilidades Motoras Finas y Edad*, 2019.

development in children is important for identifying children who may be at risk for various developmental delays.⁶

The development of fine motor skills is associated with the development of gross motor skills. The child should become skilled in carrying out certain activities using large muscle groups, e.g. jumping, which are often accompanied by synkinesia, in this case e.g. swinging hands or sticking out the tongue, which are unnecessary when jumping, but the child must develop these movements in order not to support them with unnecessary movements, which takes time, many attempts and work with this child. In the early years of life, large muscle groups, such as the shoulders and back, function much better than small hand movements. When a child draws or paints, he makes large, sweeping movements with the entire forearm, and only then perfect the small movements of his hands and fingers. As a result, the child uses artistic and writing tools more and more efficiently and precisely.⁷

Smooth, targeted, and accurate movements, both gross and fine, require a harmonious functioning of sensory input, central processing of information in the brain, and coordination with the high executive cerebral functions.⁸

When children lack skilled motor skills, they will have difficulty displaying their academic. When a child has fine motor skills difficulties, they may also have difficulties with being able to be verbally very skilled but having difficulty showing this on paper (i.e. writing, drawing or coloring). Improving their ability in, and persistence with, fine motor skills that are required for academic, play and life skills increase school readiness and academic performance of coloring, drawing, writing, cutting and pasting skills.⁹

Motor skills plays an important role not only in the performance of self-service activities or typical school tasks. The hand, as an extremely precise and highly specialized organ, performs many important functions. Thanks to it, a person can not only perform complex movements, manipulate objects, but also learn and explore reality and communicate with other people. Proper functioning in the area of fine motor skills depends on the configuration of several factors – the structure of the upper limbs and adjacent structures, the quality of the nervous system and individual experiences in motor development.¹⁰

⁶ Piek, Dawson, Smith, Gasson, 2008 as cited in: M. Matheis, J. Estabilo, *Assessment of Fine*.

⁷ S. Nazaruk, E. Tokarewicz, *Rozwój motoryki małej u dzieci 5-letnich w aspekcie ich potrzeb edukacyjnych*, Pedagogika, 2018, XXVII, 1.

⁸ R. Muthusamy et al., *Impact of sensory processing dysfunction on fine motor skills in autism spectrum disorders*, Physiotherapy Quarterly, 2021, 29(2), p. 44-48.

⁹ S. Saparahayuningsih, B. Badeni, *Improving Children's Fine Motor Skills*, Cuadernos de Psicología del Deporte, 2018, 20(1), p. 75-85.

¹⁰ M. Brodacka, *Efektywność terapii ręki w pracy z dzieckiem z zespołem Downa – studium przypadku*, [in:] *Terapia osób z niepełnosprawnością intelektualną*, Eds. A. Pawlak-Kindler, Lublin 2018.

Strategies of diagnostic and therapeutic interactions

The first condition for an effective influence supporting a child's manual development is to conduct an adequate diagnostic procedure. The analysis of a child's manual difficulties cannot be reduced only to the analysis of the child's products – drawings, letter-like signs or graphic images of the script.

The strategy of diagnostic activities in this area should include, first of all, an interview regarding the child's problems, the pace of development and the course of treatment and improvement to date. Obtaining information on problems from the perspective of the child and his parents and taking this aspect into account in the planned therapy is the basis for achieving effects important for the child in a manner acceptable to them, which consequently places the child at the centre of therapy, making it an active participant. Very often it turns out that there are discrepancies in the observations of parents and teachers or therapists, which is why it is so important to collect information about the specificity of the child's sensorimotor functioning from various sources and environments.

The next stage of collecting information should be the analysis of activities during everyday activities (play, learning, self-service) depending on the reported and observed difficulties of the child. In this situation it should be remembered to carry out the assessment in the conditions in which the child performs it normally or as closely as possible. Observing children during play provides educators and therapists with evaluative information regarding children's current skill levels. The type of play in which children engage is, on its own, an indicator of development and is used to evaluate children's developmental progression.¹¹

Assessment of the level of motor functioning in the field of gross and fine motor skills, which is another element of diagnostic interactions, should include the assessment of motor efficiency and strength and endurance of postural muscles, examination of joint mobility of the upper limbs, observation of basic postural tension, bilateral coordination, lateralization and eyeball mobility.¹²

The following should therefore be taken into account during the observation of:

- overall picture of the child (the way the child moves, muscular tension, posture and positions in which the child stays, plays and learns);

¹¹ Morrison, Metzger, 2001, as cited in: D. Marr et al., *The Relationship Between Fine-Motor Play and Fine-Motor Skill*, NHSA Dialog, 2004, 7, 1, p. 85.

¹² K. Piotrowska-Madej, A. Żychowicz, *Smart Hand Model. Diagnoza i terapia ręki u dzieci*, Gdańsk 2018.

- posture and movement patterns (head control, shoulder positioning and torso control, possible asymmetries, contractures and deformities, mobility of the upper limbs, associated reactions (co-movements), unquenched reflexes);
- functions of the upper limbs (supports, elbow extension, way of reaching, type of grip, the ability to loosen the grip, movement habits, the possibility of movement dissociation);
- hand dexterity and manipulation skills (does the child perform precise finger and hand movements, grip quality, dissociation of finger movements)
- graphomotor skills (how a child grasps a tool, analysis of the writing style, graphomotor image of the script).¹³

The diagnostic procedure should also include the assessment of sensory perception in the processing of tactile and proprioceptive stimuli, as well as visual perception and eye-hand coordination.

Only this kind of comprehensive and reliable diagnosis developed in this way provides the basis for determining the challenges and strengths of the child, which may help in solving his problem and overcoming possible difficulties.

The second necessary condition for effective rehabilitation and therapeutic work in the area of manual skills is the correct definition of an action strategy. The basic principle of the used rehabilitation strategy is to base it on dependencies in the child's natural development and abnormalities in motor control. It should be borne in mind that in order to improve the performance of a specific activity, it is necessary to consider at which stage of its performance there is a problem – perceptual, motor or at the stage of central processing, and adjust the interactions in such a way that the improvement of individual perceptual and motor components contributes to the improvement of the performance of activities.

Following the natural perceptual-motor development in the process of improvement is associated with taking into account its features in the form of such elements as:

1. Proper distribution of muscle tone and central stabilization, including the development of the ability to properly distribute muscle tone around the joints (co-contraction – muscle cooperation), development of proper tension, especially in the midline of the body, which allows to maintain stabilization of some parts of the body to be able to move other parts. This also applies to the control of the upper limbs, based on the postural tension of the torso – the more stable the torso, the better the hand. Postural stabilization and stability of the upper limbs includes the stability of: shoulders, elbows, forearms, wrist is the basis for maintaining body posture during precise activities.

¹³ W. Bartkiewicz, A. Giczewska, *Terapia ręki*, unpublished training materials, 2012.

2. Tactile and proprioceptive processing – as a basis for a conscious and controlled grip

3. Integration of primitive tonic and neck reflexes – as the basis for the development of controlled motor skills

4. Development of praxis, that is, generally speaking, the ability to plan traffic, which includes such elements as ideation (ability to mentally create a motor goal and think about how to achieve that goal), motor planning (which is the ability to intentionally plan and sequence the motor actions needed to achieve the goal), motor coordination (which allows to accomplish movements with precision) and feedback (whether it was successful).¹⁴

5. Bilateral coordination – development of bilateral motor coordination, taking into account lateralization, enabling the performance of activities in an economic manner, ensuring optimal quality, the ability of both the right and left hand to coordinate according to their function when the child is writing; for example, the dominant hand is used for writing while the other hand is used to maintain the balance of the body

6. Basic visual functions – as a base for performing movements under eye control and for the development of eye-hand coordination, the child's ability to apply fine motor aspects consistently when doing writing movements

7. Development of sequencing and directionality based on an efficiently functioning and responsive vestibular system.¹⁵

Proper identification of the causes and consequences of disorders and manual difficulties will allow you to determine the direction of action. Finding the cause of abnormalities enables rational decisions to be made as to the planning and method of stimulation, therefore consultations with other specialists (ophthalmologist, physiotherapist, sensory integration therapist, neurologist, psychiatrist) are often an indispensable source of information and should be taken into account when formulating the goals of therapy. Therefore, it is necessary to consider and analyze all the factors that may affect the specific manual functioning of a given child, which will allow to set goals and a specific order of improvement actions.

A correctly formulated target of impacts should be unambiguous, measurable, attractive, realistic and achievable, as well as timely and specified in time.¹⁶

¹⁴ L. Kurtz, *Understanding motor skills in children*.

¹⁵ M. Karga, *Neurobiologiczne podstawy procesów integracji sensorycznej i podstawa ich ocean*, unpublished training materials, 2008; W. Bartkiewicz, A. Giczewska, *Terapia ręki*, unpublished training materials, 2012; H. Gidion, *The Importance of Measuring Fine Motor Skill in Early Children's Education*, *Advances in Social Science, Education and Humanities Research*, 2018, 426; K. Piotrowska-Madej, A. Żychowicz, *Smart Hand Model*; A. Giczewska, *Terapia ręki to nie plastyka* – unpublished training materials, 2021.

¹⁶ K. Piotrowska-Madej, A. Żychowicz, *Smart Hand Model*.

It should be remembered that the aim of the improvement work should always be specific skills, within the range of the child's abilities, which, from the point of view of him and those important to him, are achievable. Based on the basic main goals in manual improvement, which are self-service, school skills, play and communication, the child's needs should be detailed by working on a specific skill, a function that is important for the child during classes. Thus, the functional purpose may be, for example, to independently open and close the lock, drink from a cup, play ball, write, rather than generally improving hand-eye coordination or increasing the range of motion of the upper limb.

Since the hand performs its functions when all its components, i.e. bones, joints and muscles, function properly and their multilateral cooperation is maintained, it is important not to improve the individual components of the hand during stimulating interactions, but to perceive it as a whole. All the proposed games and exercises should, however, follow their order and should not be performed randomly. It should also be remembered that the development of fine motor skills is included in the psychomotor development of a child and runs parallel to its overall development. This means that all activities proposed to the child must be properly selected not only to the level of the child's motor and manual development, but also to the cognitive level of functioning – therefore, care should be taken that the activities are attractive, non-infantile, so as not to discourage children from further activity.¹⁷

The scheme of the improvement program is another important aspect of supporting the development of manual skills. The stimulating interactions should include the child's motor-proprioceptive preparation, stimulation of the development of hand skills and the generalization of skills.¹⁸

Before each introduction of manual exercises and games, a series of exercises and games should be introduced that stimulate deep pressure touch and involve the child's entire body. Such exercises allow you to stimulate the normalization of muscle tone, mobilize the shoulder and hip girdles, and increase the range of motion in the shoulder joint. If the scope of the child's problems allows him to move to the next stage, we move on to the next series of exercises – manual, offering games and exercises that improve the mobility of the upper limb within the elbow and wrist joints. Next, in exercises, we use activities that stimulate very precise movements in the joints of the metacarpals and fingers.¹⁹ When preparing exercises and activities, special attention should also be paid to properly adapting them to the level of development and age of the child.

¹⁷ W. Bartkiewicz, A. Giczewska, *Terapia ręki*, Warszawa 2014.

¹⁸ K. Piotrowska-Madej, A. Żychowicz, *Smart Hand Model*.

¹⁹ W. Bartkiewicz, A. Giczewska, *Terapia ręki*.

In the case of preschool children, an irreplaceable form of activity is play, the importance of which is emphasized in all spheres of a preschool child's life, and later, movement games and various forms of gymnastic exercises and physical activities involving large and small motor skills can be successfully introduced. It is the development of general motor skills, including manual skills, that is best reflected in varied forms of activity, in spontaneous and organized motor games. All these situations contribute to the improvement of motor skills.²⁰

Providing environments where children participate in gross and fine-motor play to practice and develop emerging fine-motor skill is a goal for both early childhood educators and occupational therapists. It is assumed that providing motivating play environments encourages children to participate, resulting in skill development. However, the relationship between engaging in play environments and the development of skill has not been fully established.

Educators and therapists must fully understand the relationship between finemotor play and fine-motor skill in order to facilitate development in the preschool environment.²¹

Another problem that often occurs based on the observations of researchers is that children's fine motor skills are not stimulated appropriately according to their age development stage. Often children are immediately given activities to write numbers and letters. Meanwhile, for children to reach the writing stage correctly, their fine motor skills need to be optimized gradually. Children whose fingers are not strong enough, but have been forced to write directly on paper, will often strike down writing.²² For this reason, the importance of strengthening the finger muscles first with the right stimulation to stimulate fine motor skills, only then we can we children to write.

In the entirety of manual improvement activities, it is impossible to ignore the important role of the family and the child's environment. Because motor skills emerge earlier in development, they are typically most noticeable by parents and caregivers.

It is obvious that parents should create favorable conditions for their psychomotor development from the very first days of their child's life. Lack of adequate stimulation, stimulus deprivation and poor sensorimotor environment, a lack of play opportunities in the home and a lack of awareness of the importance of gross and fine-motor experiences are possible contributing factors that can cause delays or inharmonious development of fine motor skills.

²⁰ I. Momola, *Poziom zdolności motorycznych*.

²¹ D. Marr et al., *The Relationship Between Fine-Motor Play*, p. 85.

²² Paramita, 2017, as cited in: J. Asgari, D. Himawanto, E. Legowo, *Identification of fine motor skills in children with intellectual disability*, *Journal Pendidikan Dasar*, Juni 2021, 9(1), p. 118-119.

Moreover, parents are often afraid of taking therapeutic responsibility when developmental difficulties arise. Both teachers and therapists should remember that overloading parents with improvement activities that go beyond the parent's competences and knowledge may lead to increased difficulties, creating inappropriate patterns, discouraging the child and disturbing the parent-child relationship. Therefore, home exercises should be prepared very carefully as a complement to the activities of professionals. These activities should primarily concern the everyday life of the family, take into account the daily schedule and activities most often undertaken at home.

Parents should also be made aware of the child's independence and self-service skills, appropriate to their developmental age, as key skills that have a significant impact on manual development.

It is also important to adapt the physical environment and introduce the necessary adaptations regarding furniture and auxiliary equipment at home, in school, and in kindergarten, which are sometimes necessary to facilitate the child's manual activities. Through the parents, it is possible to influence changes in the environment in which the child resides, but these changes should be thought out and adapted to the actual possibilities of the environment and the child's predispositions, e.g. adjusting the height of benches, chairs, selecting a writing tool, improving lighting. The child's working time, the number of breaks between manual activities, and the type of activity between educational activities may also require adjustment. In addition, cooperation with parents allows for a better understanding of the child's problem, taking into account its difficulties and possibilities while functioning in various conditions, and gives the opportunity to consolidate the effects of the applied interactions.²³

Summary

Knowing the needs and manual abilities of children in preschool and early school age, we can, on the basis of the discussed guidelines and guidelines, develop both individual therapeutic activities, as well as properly implement such stimulating activities in everyday educational work in kindergarten or school.

However, we should be very careful and attentive when designing qualitative games, exercises and activities so that they are adapted to the child's age, focus and persistence, and development opportunities. Understanding the child's motor functioning in various aspects of his life, during free activities, games and guided tasks as well as in various environmental conditions gives a full diagnostic picture and reduces therapeutic errors and failures.

²³ K. Piotrowska-Madej, A. Żychowicz, *Smart Hand Model*.

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