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MOTOR DEVELOPMENT OF PRESCHOOL AND EARLY SCHOOL- AGE CHILDREN IN THE CONTEXT OF DIFFICULTIES AND THERAPEUTIC STRATEGIES[1]

Abstract

The article addresses the issue of difficulties in the motor domain and the support of motor development in preschool and early school-age children. It presents the nature of children's motor disorders in the area of gross and fine motor skills and outlines therapeutic possibilities. Drawing on knowledge of more and less widely known methods, techniques and solutions, the author proposes interventions that foster stimulation of overall motor development and the remediation of its disorders.

Key words: preschool and early school-age child, motor development, educational therapy, gross motor skills, fine motor skills

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Introduction

Numerous processes and functions, including motor and physical ones, influence the correct, harmonious psychomotor development of a child. On the basis of proper motor development, appropriate cognitive, emotional and social development can take place (Wielądek, 2024). The importance of motor skills for children's language outcomes has also been demonstrated (Gonzalez, 2019).

Two basic types of motor skills are distinguished: gross motor skills (body posture and locomotion) and fine motor skills (grasping and manipulation). Adequate gross motor abilities and manual dexterity are important conditions for a child's success at school.

Gross motor skills are linked to movements of the whole body and concern large muscle groups. Motor skills are to a significant extent interdependent. They do not develop in a random order. Progress in acquiring them is subordinated to two principles. The first states that control over the body develops in a cephalocaudal direction- from head to feet. The second principle of development indicates that it proceeds in a proximodistal direction, which means that more centrally situated body parts come under control earlier than parts distant from the midline axis. Earlier acquired motor skills provide a foundation for important abilities that emerge between the second and seventh year of life. Here we refer to three basic systems of movements: locomotor, manipulative and stabilizing. Locomotor movements include walking, running, jumping, hopping and climbing. Manipulative movements involve throwing, catching, striking and pushing. Stabilizing movements are related to body control in the context of gravity and comprise bending, stretching, turning, swaying, twisting, standing upright and walking on a balance beam. These skills appear in a typical way in all children (Kurowska, 2011).

The proper course and development of gross motor skills is one of the conditions for the development of fine motor skills. The development of fine motor skills is embedded in the child's overall psychomotor development. A child is born with decreased central and proximal muscle tone and clearly increased tone in distal parts of the body. Only the levelling of the difference in tone between distal and proximal body parts in the course of development allows for free movement in space (Szmalec & Wieczór, 2020).

Mastery of smooth global movements makes it possible, at the next stage, to perform precise hand movements. Small muscles are involved in fine motor skills; they make it possible to use small objects or drawing tools. Fine motor skills require eye-hand coordination and concentration on activities that are performed with small movements of the hand, such as modelling, kneading, grasping, threading, fastening, drawing and writing (Stelmasiak & Różańska, 2021). In the early years of life, large muscle groups, e.g. of the shoulders or back, function much better than small movements, e.g. of the

hand. When drawing or painting, a child performs large sweeping movements with the whole forearm and only later refines small movements of the hand and fingers. The child should gain proficiency in performing certain activities using large muscle groups (Nazaruk & Tokarewicz, 2018).

Not every child undergoes developmental changes at the pace and to the extent we might expect. Approximately 17-22% of the population of children present developmental disorders, which are understood as "any unfavourable deviations from the level of development appropriate for a given age – deviations both in the structure of the organism and in its mode of functioning, irrespective of the causes that led to them" (Lisowska, 2008, p. 145). In addition to children who develop normally in motor terms and those distinguished by exceptional physical fitness, there are also children who perform tasks that are easy and pose no difficulty to their peers only with great effort. Besides problems in performing activities that require motor skills, these children also experience difficulties in tasks preparing them for learning to write and in writing itself (Kurowska, 2011). In the course of motor development, various types of disorders and delays can be observed in some children. Delays in motor development may concern the child's motor functioning as a whole (dynamic coordination, static coordination, manual dexterity, eye–hand coordination), that is, have a global character, or a partial one, when the child acquires only some motor skills more slowly while others develop at a normal rate (disharmonious motor development). The problem of reduced manual dexterity concerns a growing number of children (Kowalewski, 2014).

According to Halina Spionek, motor development disorders include:

- reduced efficiency of individual motor acts, e.g. of the pincer grasp, which hampers the performance of precise movements;
- disturbances in the "melody" of movement and motor coordination. The child performs individual movements correctly but is unable to connect them into a harmonious whole;
- reduced precision of goal-directed movements together with increased psychomotor drive. Goal-directed movements are accompanied by associated movements (synkineses) and increased muscle tone. The child expends a great deal of energy on unnecessary movements;
- disturbances in eye-hand coordination, as a result of which the child has great difficulty in learning to adapt its movements to the properties of objects (as cited in: Kowalewski, 2014, p. 24).

Research on motor performance, as well as teachers' observations, point to a progressive regression of basic motor abilities (Szczotka, 2017). In preschool and early school-age children the most common patterns of motor disorders include: clumsiness of the whole body (a milder degree of delay in motor development) and manual clumsiness (which may occur against a background of general delay in motor

development or have an isolated character) (Skibińska, 2001). Barbara Zakrzewska (1996) notes children's problems resulting from increased muscle tone, manifested in stiffness and low fluency of movements, and an overly strong pressure of pen or ballpoint. Such selective disturbances of motor functions considerably heighten reluctance towards writing.

Disorders concerning balance, motor coordination and eye-hand coordination may affect peer relationships, independence skills and play (van der Walt et al., 2020). Both motor clumsiness and poor manual dexterity impact in many ways on the child's schoolwork (Czajka et al., 2019).

During writing activities, the symptoms of motor clumsiness include: lack of precision of movements, increased muscle tone, synkineses and a slow work pace. Writing requires mastery of both grasping and manipulative movements. The whole hand is engaged in the act of writing; the movements involve not only the fingers but also the forearm and elbow (Kurowska, 2011). The motor aspect of writing skills consists in coordinating the movements of the hand (arm, forearm, wrist and fingers). The skeletal and muscular system of a 6-7-year-old child is not yet fully developed; therefore, at the beginning of learning to write, children often have difficulties related to: (1) harmonizing large (arm, forearm) and small movements of the hand (palm, wrist, fingers) while simultaneously being able to adjust the tone of particular muscle groups; (2) the need to use a series of small, only slightly differentiated movements with constant change of their direction (upwards, downwards – advancing movements) and at the same time maintaining the direction of writing (from left to right – progressive movements); (3) the spatial organization and rhythm of handwriting (place of beginning words, positioning within the lines, maintaining appropriate spacing and size of letters) (Szmalec & Wieczór, 2020).

Difficulties in writing are also contributed to by disorders of lateralization. The progressing process of lateralization -functional predominance of one side of the body, associated with the dominance of one cerebral hemisphere - is one of the aspects and factors of a child's motor development. The lateralization process is influenced by proper muscle tone and deep sensation, which manifests itself in a correct body schema (Gołyszny, 2014). Lateralization of hand movements is usually established in the 6th-7th year of life, and homogeneous lateralization of hand function is fully formed at 12-14 years of age. Each child is born with a certain predisposition to sidedness and, over time, in the course of lateralization, becomes either right-handed or left-handed. Dominance of one hand is beneficial, since once it is established, a sense of stability and security appears, and the conditions for developing skills at a level that would not be possible with equally frequent use of both hands are created. By contrast, in the case of crossed dominance, difficulties occur in the cooperation of particular limbs and paired organs. Unestablished lateralization results in weaker, slower and less precise movements compared to right-handed or left-handed children (Kowalewski, 2014).

A delay in motor development may be compensated over several or a dozen or so years of the child's life; however, it may also persist into adulthood, leaving lifelong traces. Studies show that children with difficulties in motor skills do not simply "grow out" of this problem; they need specific therapeutic support in order to make progress and avoid regression. Research further demonstrates that group therapy based on play has a positive impact on improving motor skills, with evidence supporting the effectiveness of small therapeutic groups (van der Walt et al., 2020).

Remediation and Correction of Overall Motor Development

Exercises in the motor domain concern the improvement of general motor performance and the refinement of manual skills. Remediation of gross motor skills is indicated particularly in cases of marked delays in motor development; it helps prepare the child for manual dexterity exercises.

Interventions aimed at stimulating overall motor development and correcting its disorders require appropriate motivation of the child to undertake movement activities. Critical remarks about the child's clumsiness must not be made, and unfavourable comments from other children should be mitigated. Moreover, participation in play and movement games should not be rigidly enforced. Tasks set for the child must not exceed its motor capacities. The programme of activities needs to include exercises that improve movements, their speed, precision, coordination, rhythmicity and "kinetic melody" (smooth transition from one element of movement to another) (Skibińska, 2001).

Among the many strategies that aim to enhance a child's overall motor abilities, the therapeutic value of the Smart Hand Model approach should be highlighted. This method is used to support the development of children with motor difficulties. Its authors have developed numerous gross motor exercises that improve postural stabilization and stabilization of the shoulder girdle. Balance exercises play an important role here, as they improve general physical fitness, which in turn provides the basis for developing fine motor movements. Exercises should be carried out regularly. In addition, the principle of gradation of difficulty must be observed: from a high starting position we move to a low one and reduce the support surface. Vision facilitates the performance of exercises; therefore, exercises with closed eyes should be introduced gradually. Static exercises involving maintaining the body in a fixed position (e.g. standing on one leg) are most difficult for children; therefore, it is useful to introduce thematic games that require them to undertake such activities (Piotrowska-Madej & Żychowicz, 2018).

Balance exercises are also served by such activities as: (1) walking and marching with a change in direction in response to an auditory and/or visual signal, movement riddles, ball and dexterity games, skipping rope jumps combined with reciting

automatized sequences, e.g. names of months, or with eyes closed, and (2) crawling on all fours (also with a load on the back), standing in stork and swallow positions, walking with a beanbag on the head, walking on stones, heel-to-toe walking; leaning forward and backward with the child sitting astride on a ball, pushing at the child's shoulders and hips while the child attempts to maintain balance in a slight straddle on the whole feet, sitting on a skateboard and pushing off from the wall with the legs (Cieszyńska & Korendo, 2008; Klim-Klimaszewska, 2015; Słupek, 2017).

Another therapeutic proposal that includes balance exercises is Nelson Kephart's perceptual-motor system. It is based on the assumption that muscular–motor reactions are the preliminary condition of all behaviour. The child must try out all the possible motor reactions of which it is capable. In this way we can determine the range of its motor capacity and identify the movement patterns that need to be improved. An example is an exercise using a balance beam. The simplest version consists in walking along a paper "path" placed on the floor. The width of the "path" is gradually reduced, and then the child walks along a beam lying on the floor. The exercises include walking along the beam in a forward, backward and sideways direction. To increase the difficulty, the child may, while walking, turn through any angle (from 90° to 360°), additionally holding plastic cups filled with balls in the hands or carrying a prepared bundle on the head. Another balance exercise requires a square board with dimensions of 40 × 40 cm, under which a block 40 cm long is placed. The child, standing on the board, must maintain balance. Depending on the orientation of the support, the child balances the body and keeps balance in two directions: right-left and front-back. Additional difficulty may be introduced by simultaneous play with a ball, throwing at a target, imitating movements or pointing to body parts (Klim-Klimaszewska, 2015).

Remediation of motor development is also offered by the Method of Sound Symbols. It includes several groups of exercises, among them those relating to the motor sphere. The exercises are intended to stimulate the motor activity of the whole body in the area of voluntary and controlled movements. Motor expression initiates the methodological sequence. The next steps are: artistic interpretation of musical pieces, learning and manipulating sound symbols, verbal-musical-movement games, relaxation. The starting point is any music that is supposed to stimulate motor activity. Children are encouraged to move freely "as the music invites them", after which inhibitory-excitatory exercises (stimulating and inhibiting) are introduced. In the final phase of the exercise, an effort is made to limit unnecessary movements and to organize them by means of rhythm. For this purpose, rhythmic marching is introduced, whose rhythm can be reproduced by clapping, stamping or using percussion instruments. The area of movement can also be modified. One begins with large, sweeping movements and ends with small ones (Kaja, 2001).

Proper sensory processing is of great importance for child development, especially in the preschool and early school period. Jacek Szmalec (2023) recommends that therapeutic activities aimed at improving motor functioning should include the concept of sensory integration (Szmalec, 2023). Sensory integration therapy leads to improvement of performance in many domains, primarily movement, posture, coordination, emotions, perception, attention and, ultimately, learning mechanisms (Gumulak, 2020). Proper functioning of sensory systems is crucial for acquiring new motor and cognitive skills. Research findings show that sensory–motor activities engage multiple sensory systems simultaneously, thus facilitating integration of sensory information. Activities such as swinging, jumping and climbing provide vestibular and proprioceptive input. These activities help children develop motor coordination, balance and body awareness. Such stimuli are essential for motor development (Kumar, 2024).

One category of sensory processing disorders comprises sensory-based motor problems. They include two types: postural disorders and dyspraxia. A child with postural disorders usually presents reduced muscle tone: it has a weak grasp and poor manipulation of objects, evident difficulties in assuming and maintaining an upright posture, as well as in fully flexing and extending limbs. The child is usually hunched, and its posture at the desk is sloppy. A child with dyspraxia, in turn, has problems with planning a new complex action, its individual steps, adjusting body movements to them and executing a multi-step sequence. The child may be clumsy, tripping over objects and people (Dudzińska, 2020).

The literature on the subject constitutes a fairly rich source of information on exercises recommended for working with children with sensory processing disorders.

Bożena Odowska-Szlachcic (2022) has developed several guidelines and many exercises for working with children. She advises teachers (and parents) to use a large mirror during exercises so that the child can see its whole silhouette, to take into account the child's interests and strengths, and to reduce the excess of stimuli in the classroom.

Among the recommendations for stimulating the vestibular system (not requiring specialist equipment) the following exercises are suggested:

- jumping with both feet in place, forwards, backwards and sideways; jumping from one foot to the other; squatting and standing up; frog jumps; attempts at two-footed jumps in a squat; jumping jacks; rocking forwards and sideways; running up and down stairs;
- jumping with both feet into a hula-hoop and out of it; running with knees lifted high; side running; assuming the "ready, steady, go" position;
- forward and backward rolls, pendulum-like head movements, looking far behind alternately over the left and right shoulder;
- sliding in circles on the stomach and on the back; circling on the buttocks in a sitting position; polishing the floor; stretching an elastic band: sitting with

legs straight, arms in a "wings" position, elastic band or skipping rope in the hands hooked under the toes, movement – maximal dorsal flexion of the feet aided by pulling the skipping rope towards oneself;
- swinging in a blanket, riding a scooter, turning on a swivel chair, rolling on the floor;
- "pancake"- wrapping the child in a blanket or mat (the head always remains outside) and then pressing the back, buttocks, arms and legs using bags and mats filled with rice, sand or beans; pushing and wrestling games: the child and the parent press against each other with their backs, legs, shoulders and hands; rolling a ball up the wall and back towards the floor with the feet while lying on the back (Waligóra-Huk, 2013; Szmalec, 2017; Odowska-Szlachcic, 2022).

Jaane Komar and Carol Kranowitz (2022) propose including physically effortful activities, which can be suggested by the teacher in preschool or school: placing chairs on desks at the end of the day; helping the physical education teacher move mats and hang equipment; imitating animal gaits; the so-called "wall pushing"; cleaning desks; wiping the board.

Remediation of Fine Motor Skills

The preschool period and the early school years are particularly important for shaping basic manipulative skills needed in primary school, where 30-60% of time is devoted to learning to write and to other manipulative tasks. Between 3 and 6 years of age, the wrist stabilizes on the inner side. This allows children to begin activities that prepare them for learning to write, one of the most important skills in the first years of primary school (Czajka et al., 2018).

Early diagnosis of a child's motor development conditions the possibility of detecting and predicting potential learning difficulties and of undertaking actions that optimally stimulate impaired functions. Early detection of delays and early stimulation of a child's development is more beneficial and effective than long-term therapy of already consolidated disorders (Kurowska, 2011). In-depth identification of the child's difficulties should include the following stages: (1) interview with parents concerning the child's developmental history and functioning in everyday life; (2) analysis of self-care activities; (3) assessment of lateralization and orientation in body schema and space; (4) assessment of muscle tone and overall gross and fine motor abilities; (5) analysis of the visuomotor domain (Piotrowska-Madej & Żychowicz, 2017).

Before starting therapy, attention should be paid to some elements related to writing or drawing, namely to an incorrect pencil grip and an improper posture during

writing, which need to be changed. An incorrect pencil grip affects the low quality of writing/drawing. It is therefore necessary to shape a proper pencil grasp: the pencil should be held between the index finger and thumb and rest on the middle finger. To correct an improper grip, the child should be provided with an appropriate pencil grip. The child should hold the pencil at a distance of about 2-2.5 cm from its tip. If the child holds the pencil too low, so that the thumb obstructs the field of view, the child bends the head to see what it is writing. This leads to postural disorganization and improper distribution of muscle tone. A proper pencil grip also requires correct positioning of the pencil in relation to the wrist.

Improper posture during writing leads to faster fatigue and, consequently, worse handwriting. It is necessary to adjust the height of the chair to the child's height so that the feet rest on the floor. The height of the desk is also important - the forearms of both arms should rest on the tabletop (Przyrowski, 2021). It often happens that an incorrect posture at the desk results from a reduced muscle tone in the trunk region. Irregular regulation of muscle tone (both in holding the pencil and in assuming an improper posture) is a characteristic feature of the handwriting of a child with dyspraxia (Odowska-Szlachcic, 2021).

A holistic form of working with a child who has difficulties in manual functioning is termed "hand therapy". The therapeutic process according to the hand therapy scheme is adapted both to the level of physical and psychological development of the child. The therapy programme therefore includes not only interventions that improve the child's motor and manual skills but also supports its cognitive sphere (Zielińska, 2020). The aim is to improve fine motor skills, stimulate the development of precise hand and finger movements, and provide varied tactile experiences that contribute to the development of stereognosis. Hand therapy is intended for individuals who have difficulties in learning new manual and manipulative activities and in planning and executing hand movements. Indications for therapy also include: problems in learning self-care activities; reduced or increased muscle tone in the trunk, shoulder girdle and hands; difficulties in coordinating the work of both hands; tactile hypersensitivity and hyposensitivity in the upper limbs; lack of ability to adjust the strength and pace of hand movements to the nature of the activity performed; and disorders of eye-hand coordination. These difficulties may occur alone or in various configurations (Brodacka, 2014).

Remediation of hand motor skills and eye-hand coordination should begin with large movements of the arm and forearm and conclude with small, precise movements of the wrist, hand and fingers. Above all, the aim is to improve this ability sufficiently for the child to cope adequately with activities requiring fine, precise hand movements. It is important that the child be able to write quickly enough and legibly. Overcoming difficulties related to penmanship and writing helps children acquire knowledge in the

first years of schooling and improves their academic achievement in later years (Czajka et al., 2018). It is worth emphasizing that pre-writing graphic exercises are intended not only for children with manual disorders but also for children whose handwriting is not conducive to achieving speed and consolidating correct spelling (Gąsowska & Pietrzak-Stępkowska, 1994). Manual dexterity exercises also serve other goals: they improve visual analysis and synthesis, directional and spatial orientation, strengthen concentration and eliminate excessive motor agitation (Klim-Klimaszewska, 2015). Such exercises constitute the final stage of preparing the child for learning to write (Słupek, 2017).

The proper process of improving a child's hand requires knowledge and consideration of certain principles. First, the child's activities should be monitored and correct performance should be taught. It is sometimes necessary to physically guide the child's movements or to verbally instruct and cue the child as to the correct way of constructing a drawing. It is also important to follow the principle of gradual increase in difficulty. This means moving from simple/easy tasks to progressively more difficult ones, requiring increasingly fine and precise movements. Exercises that improve finger movements and prepare the child for more precise activities are helpful here. If the child does not show major difficulties during painting or drawing, but small precise movements pose considerable problems, exercises may begin with graphic activities preparing for writing. In these exercises, we develop in the child a readiness to write continuous, fluent sequences of signs/letters, which greatly facilitates the mastery of correct handwriting. Another principle concerns the type of exercises used in working with the child. Children with impaired motor skills often present very high muscle tone. The hand is stiff, especially when movements are more complex. For this reason, exercises that relax muscles and reduce muscle tone should be introduced first. Thus, at the beginning, simple horizontal, vertical and circular movements are recommended, gradually incorporating more complex movements, always progressing from left to right. It should be mentioned that circular movements should be performed counterclockwise. The purpose of these exercises is for the child to achieve movement fluency. Drawing promotes the improvement of manual dexterity; however, children with manual difficulties are reluctant to draw. Therefore, therapeutic interventions are worth beginning with other types of manual activities. The child can be quite easily engaged and encouraged to effort by proposing painting with tools that it has not used before. Sometimes it is enough to suggest making a picture with a very thick brush and paste paints. If, in addition, the tasks are fairly easy and provide joy from achieving previously unseen artistic effects, there is a chance to overcome the child's reluctance to manual work. Activities that improve hand dexterity should be carried out systematically, in parallel with activities that improve impaired perceptual functions (auditory analysis and synthesis). It is worth adding that manual activities

can have a relaxing and calming effect, and thus are a valuable form of activity also for children whose hand dexterity is adequate (Gąsowska & Pietrzak-Stępkowska, 1994).

Manual dexterity exercises include: large-movement exercises, manual exercises and graphic exercises. Large-movement exercises serve to relax the muscle tone in the arm and forearm. The child should be offered a range of activities, in particular:

- games such as "Arrival and departure of storks", "We walk through tall grass"- pushing aside "grass" with both arms extended forward combined with side swings; "Conducting an orchestra"; drawing a treble clef, a house, a circle in the air with one hand;
- painting large areas with a large brush using horizontal or vertical movements, maintaining the direction from left to right, top to bottom; painting a large space delineated by a contour; thickening the contours of large geometric shapes and large drawings; tracing large letters, geometric figures, wavy lines and spirals in the air; painting large circular forms with a smooth, continuous movement in the counterclockwise direction, starting from the point corresponding to the number 2 on a clock face (Skibińska, 2001; Klim-Klimaszewska, 2015).

Manual exercises improve small movements of the hands, wrists and fingers. The following activities promote this:

- construction play: putting one cup inside another, inserting a stick into the opening of a bottle, pouring and transferring materials, etc.; assembling constructions from ready-made elements; flat puzzles (arranging on a model, according to a model and without a model);
- painting with a wad of cotton; filling in contours; threading beads; lacing strings through holes in cardboard; twisting a string; crushing and smoothing crumpled paper; cutting paper (cutting along straight and wavy lines, cutting out geometric shapes and outline drawings); cut-and-paste work with paper, fabric, yarn; paper folding (simple origami);
- using tools; stamping; juggling small objects;
- games: tiddlywinks, jumping frogs (Cieszyńska & Korendo, 2008; Pinkowska & Szymańska, 2009; Klim-Klimaszewska, 2015; Odowska-Szlachcic, 2021).

Within this group of exercises much attention should be devoted to the hands and to improving the fingertips. Suggested hand exercises include: touching hands together, rubbing them, "washing" them, clenching and opening the hands, squeezing a sponge or foam ball, wringing water out of a soaked sponge, opening and closing various types of boxes, playing with water (Stelmasiak & Różańska, 2021). Exercises that improve the fingertips prepare the child for proper holding of writing tools by developing appropriate muscle tone and the pincer grasp. Suggestions in this area include:

- touching, in turn, each finger of each hand to the thumb: thumb to thumb, index to index, etc.; attaching clothes pegs to the edge of a cardboard box; playing with chenille stems;
- imitating (tapping on the table) playing the piano, typing on a typewriter, reproducing the rhythm of falling rain, "shaking water off the fingers", "shaking sand out of the sleeve"; imitating a walking insect – thumb resting on the table, then index finger, then middle finger, then again thumb, etc.; drawing with a dry finger; finger painting; wiping fresh paint off the sheet with a wad of cotton; modelling in clay, plasticine, modelling compound (Słupek, 2017; Stelmasiak & Różańska, 2021).

Graphic exercises improve fine movements of the hand in a position similar to that used in writing. These exercises should use mainly coloured pencils and felt-tip pens. When correcting pencil grip, triangular and ergonomic grips for pencils and pens are recommended, as well as a non-slip mat to stabilize the sheet or notebook on the desk, a writing template with an acoustic signal, triangular crayons and pencils (Odowska-Szlachcic, 2021). The child is given the following tasks:

- tracing circular forms and straight lines connecting designated points – "hitting the target", drawing lines within a limited field; colouring contour drawings; copying drawings;
- drawing patterns and designs composed of letter elements; drawing patterns (along dotted or dashed lines) of geometric figures, simple patterns (3–4 cm high), picture contours; thickening contours, i.e. tracing geometric figures, simple patterns, contours of pictures and large letters;
- drawing geometric figures and simple objects using templates in order of increasing difficulty: inner templates (cut-out openings in cardboard or plastic) and outer templates (a cut-out shape for tracing); drawing on frosted glass and on so-called magic pads;
- hatching- filling in contours with colour using parallel horizontal or vertical lines, maintaining the direction from left to right and from top to bottom (Gąsowska & Pietrzak-Stępkowska, 1994; Klim-Klimaszewska, 2015).

In therapeutic work with a child who requires manual remediation, it is worthwhile to use Hana Tymichová's graphomotor exercises. These exercises are particularly recommended for children who present: incorrect body posture during graphic activities; improper positioning of the hand and fingers; incorrect pencil or crayon grip; inadequate muscle tone in the hand; slow drawing and writing; quick fatigue during drawing and writing; low graphic quality of drawings; reluctance to draw. The graphomotor exercises proposed for children aged 5-8 years thus improve hand movements and eye-hand coordination. They help children achieve readiness for learning to write. Additionally, they correct improper drawing and writing techniques.

Graphomotor exercises according to Hana Tymichová include: (a) simple patterns, i.e. designs and figures (to be traced continuously), (b) complex (more difficult) patterns, also to be traced without lifting the hand from the pattern, (c) pictures/schemes for copying (to be reproduced independently). In left-handed children, the pattern should be placed in front of the child slightly to the left of the midline and diagonally (the upper left corner directed upwards). When tracing patterns, the child should first be acquainted with the pattern, encouraged to describe its elements and informed of the need to make a continuous movement. Before the child starts drawing with a pencil, it should follow the course of the movement by tracing the line with a finger. Attention should also be paid to the four positions indicated by Tymichová, which the child should adopt when performing the exercises:

1. Drawing in the horizontal plane in a standing position (pattern placed at the child's chin height). This position reduces muscle tone, especially in the elbow joint. The child, standing in front of a sheet attached to the wall or cupboard, traces the pattern.
2. Drawing in the vertical plane in a standing position. The pattern lies on the table. While drawing in a standing position, with the arm hanging down, muscle tone is reduced mainly in the shoulder joint.
3. Drawing in a sitting position with the elbow raised – this reduces muscle tone in the elbow joint.
4. Drawing in a sitting position with the forearm supported – this allows relaxation of muscle tension in the wrist joint.

After a series of such exercises, the child may reproduce the pattern in any position (Bogdanowicz, 2004).

Another methodological solution that combines the child's movement with manual activity is found in Dorota Dziamska's system (2005), called "Education through Movement". The author distinguishes the following forms of exercises: (1) graphic exercises affecting lateral stabilization, performed on small and large surfaces with one hand; (2) graphic exercises affecting interhemispheric synchronization, performed on small and large surfaces with both hands; (3) graphic exercises affecting lateral balancing, performed on small and large surfaces alternately with one and the other hand; (4) manipulative exercises supporting dexterity of the hand, arm, leg and the whole body using didactic toys that help achieve concentration; (5) rhythmic manipulation exercises using didactic toys, affecting the lateral balancing of the body; (6) spontaneous whole-body movement exercises as a form of non-verbal communication that support concentration and multisensory learning.

Among methods preparing children for learning to write, Barbara Kaja's proposal (2001) deserves mention. The assumption of her method is to improve and harmonize all psychomotor functions. The method is used in prevention - improving hand

motor skills and includes exercises preparing for writing - as well as in rehabilitation (emotional disorders, delays in psychomotor development, disturbances in the dynamics of nervous processes). The method requires prior preparation of materials: sheets of wrapping paper (55 × 40 cm), paints, bowls of water and towels. The wrapping paper should be attached to the table top. The height of the table should be slightly above the child's elbow level. Participants should have free access to the table (from each side). The child (or a group of 4-6 children) listens to verbal instructions such as: "These bowls contain paint. We are not going to use brushes; we have ten fingers -five on one hand and five on the other; we will paint with our fingers. You can paint whatever you want; tell me when the picture is finished." If the child shows fear of putting the hand into the paint, the therapist dips their own hand and makes a streak on the paper. The picture painted by the child is always displayed (hung on the board as a sign of recognition). Therapy should last 8 weeks - twice a week for 20-30 minutes.

Elements of gross and fine motor exercises can also be found in the method developed by Marta Bogdanowicz (2014). The basic assumption of the method is to develop functions (including motor, motor-auditory and motor-auditory-visual) that underlie the complex activities of writing and reading.

Movement exercises usually appear in the form of physical games that relate to the song's content. In this part of the session, movements of the whole body- gross motor skills- are engaged. Children practice maintaining balance and overall physical fitness. Motor- auditory exercises, in turn, involve activities such as the child tapping (with fist, hand or fingers) the rhythm of the song on beanbags or on a drum. Within motor-auditory-visual exercises, multisensory learning of a pattern takes place - children trace the pattern (e.g. a particular letter) with a finger while simultaneously singing the song. They then reproduce this pattern in various ways, e.g. with a finger in the air, on the table surface, on the floor, on trays filled with sand, with chalk, charcoal, crayons, a thick marker -on a sheet of paper.

Manipulation is very important in developing hand dexterity and movement precision. Klaudia Piotrowska-Madej and Agnieszka Żychowicz (2018) propose three groups of manipulative exercises with children: (1) preparatory exercises, (2) exercises that refine manipulation patterns, (3) exercises that develop cutting skills.

The aim of preparatory exercises is to improve deep and superficial sensation. Among the proposed activities, the authors include:

- activities in tactile preparation, e.g. playing with shaving foam or lotion, finger painting, using beans, pasta, etc.;
- activities in proprioceptive preparation: pressing the hands against the surface of a chair, pushing heavy objects, tug-of-war, climbing ladders, etc.;
- exercises that use differentiation of pressure, e.g. wringing out water, tearing pieces of paper or clicking various pens;

- activities in tactile differentiation: differentiating textures, matching pairs of objects according to a tactile feature without visual control, guessing the name of an object from its shape, etc.

Developing basic manipulation patterns is a condition for acquiring finger mobility. Exercises of translation, shift and rotation patterns performed during the preschool period make it possible to obtain finger mobility that increases the ergonomics of writing in the early school years and later.

Examples of exercises involving translation: picking up coins or other small items and hiding them in the palm, tearing off a piece of newspaper and holding it in the palm (translation of the object from the fingers to the palm); transferring a bead from the palm to the fingertips and dropping it into a bottle with a narrow opening (translation of the object from the palm to the fingers); turning pages in a book, sliding a bead along a string, moving a pencil in the fingers like a caterpillar from its base to the sharpened end, moving a toy in a tunnel using only one hand (shift); spinning a top, turning screws, opening small jars (rotation).

Graphomotor exercises affect movement precision, eye–hand coordination and coordination of whole-body movements. In this group of activities, it is worth engaging children in finger plays, which develop a precision grip, finger dissociation, coordination of hand and finger movements, muscle strength and mobility of the forearms, wrists and fingers (Piotrowska-Madej & Żychowicz, 2018).

Conclusion

A child's motor activity is an important determinant of health and psychological well-being, forms the foundation of comprehensive development and supports success (in school and in life). Children with disorders or delays in motor development can be regarded as being at risk of dyslexia. The motor sphere is closely linked to cognitive, emotional and social development. These are important reasons to recognize the necessity of including motor activities in comprehensive support of child development.

Acquiring proficiency in gross and fine motor skills is a long-term process. It is, however, easier to instil proper motor habits in preschool and early school-age children than in older children. The first signals of difficulties should be identified as early as possible and professional assistance should be offered. These problems will not disappear spontaneously and will certainly intensify and impede functioning in other areas of the child's development.

The effectiveness of teachers' interventions that stimulate and support children's motor development is determined especially by their competences, concern for the systematic nature of interventions, provision of attractive therapeutic activities and cooperation with parents (who are usually more concerned with children's cognitive

development than with their motor abilities). Stimulating and corrective activities in the motor sphere should be treated in an integrated way with perceptual activities. This means that sensory and motor abilities should be developed in parallel.

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