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Role of toys in the development of healthy infants

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Abstract

Developmental outcomes in infants can be significantly improved thanks to promising use of appropriate toys. Objective assessment of their positive influence to functional achievements in healthy infants may completely change attitude to new generation of toys, developing motor, cognitive, and social skills. Despite advances in toys assessment their true influence remains incomplete. This study aims at assessment how current knowledge and experience influences principles of the toys selection and use in healthy infants.

Introduction

Developmental outcomes in infants can be significantly improved thanks to promising use of appropriate toys. Objective assessment of their positive influence to functional achievements in healthy infants may completely change attitude to new generation of toys, developing motor, cognitive, and social skills.

Despite advances in toys assessment their true influence remains incomplete. The new concepts based on summarized current knowledge and experience may constitute significant contribution of developmental intervention and shape new intervention strategies.

This study aims at assessment how current knowledge and experience influences principles of the toys selection and use in healthy infants.

Early use of upper limbs

Early use of upper limbs and toys in infants aims at moving, object(s) manipulation, increasing knowledge of toy/environment use and fulfill communication through gestures and toy/object use. Specific communicative function to 8-16-month-old infants' gesture and its interpretation by parents/caregivers was studied by Dimitrova et al. [1]. There are two main issues:

- ability of child to communicate successfully its intent with gesture,
- interpretation of parents/caregivers.

The results show importance of knowledge shared between children and their parents/caregivers and its influence to a proper interpretation of the gestures [1, 3, 4].

Current milestones in infant development [5; 6] allow to assess both physiological and pathological patterns of movement. Careful observation, despite subjective, is main tool for early diagnosis, prevention and therapy of pathological movement patterns (e.g. using NDT-Bobath Concept). Their videotaping, measurement, and analysis allow for creating the convention of gestures used by particular infants. Grasping, reaching and laterality test in infants increase possibility to early detect risk for hemiparesis hemiplegic cerebral palsy (asymmetrical upper extremity performance: poor upper extremity movements, midline behaviors, fine or gross motor skills) [7, 8, 9]. Typical high-risk behaviours are: problems in adaptation of the posture to the variable repertoire of possible situations, delay and non-optimal reaching performance, problems in ambidextrous grasp, poor coordination: posture-reaching-grasp. We should take into consideration three important issues:

- in infants reaching movements are performed usually during sitting,
- movements get straight and smooth with age,
- most impairments may be observed in the 7-12 months of life [5, 6].

Various sensorized toy are also useful for monitoring and measuring infants' motor development [10, 11]. Such toys usually apply simple pressure sensors (e.g. to assess grasping function) and audio-visual feedback. Despite many prototypes and preliminary tests there is lack of more advanced clinical trials.

Toy-oriented changes

Conscious and purposeful selection of used toys can influence the pace of maturation of sensory, motor and cognitive abilities in healthy infants, taking into consideration achievement of developmental milestones.

Sleep position, play position, and use of toys influence on motor development [12]. Use of toys (or other objects) can significantly influence both short-term and long-term upper limb use in infants, reflected in hand and joint kinematics [13, 14]. Spontaneous arm movements

associated with toy using (reaching, grasping) can be different from those observed in other groups of infants. Moreover aforementioned differences can be divided into three stages: early phase (8-10 weeks before reaching), middle phase (4-6 weeks before reaching), and late phase (within 2 weeks of reaching) characterized by various behavioral changes [13]. Purposeful reaching constitutes whole adaptable continuum.

Cognitive development in healthy children can be significantly shaped by toy used. Traditional instrumented block-box toy is used in infants to assess their spatial cognition skills (ability to insert objects into holes) [15]. Searching behavior (for disappearing object/toy) is present in 5- to 6-month-old infants [16]. Research of Munakata et al. showed that 7-month-old infant is able to push a button to light a set of distant lights or to retrieve the toy [17]. Observational learning is associated with imitation for object manipulation in infants between 10 and 12 months of age – older infants performed such action more quickly, and uses increased variety of objects [18]. Various toys need for various grasp and creative thinking. This is a step toward simple team behaviors: imitating (with and without training to repeat), transferring the toy between children, group toy using, and then task sharing (cooperation) during play. Full demonstration (i.e. replication of target actions to achieve action effects) is not necessary in 19-month children, but of course action reproduction is preferred as simpler [19]. Thus the most important for intended goal-directed actions in infants seem be:

- observe sequence of movements (action),
- observe the action effects,
- learn relations between aforementioned movements and action effects,
- acquire about movement-effect relationship [Elsner 2007].

But conflicts concerning sharing an single attractive toy begins in much older children [20].

Discussion and conclusions

There is still discrepancy between scientific research, current knowledge, and clinical practice. Research (especially randomized controlled trial) do not cover full spectrum of possible interventions. Review by Orton et al. showed only short-term effectivity of developmental intervention postdischarge on pre-term infants [21]. We need more evidences concerning long-term results (i.e. concerning pre-school age and school age) of such programs.

There are many threats, especially in high-risk infants, e.g. stimulation in children with epilepsy should be limited. Background TV reduces toy play length and focused attention during the play, especially in infants [22]. Also gun-shaped toys are perceived fear by many researchers [23]. Within-sex comparisons showed that toy preferences in 2-years old children are weak associated with sex: infant-girls preferred typical female toys, but infant-boys showed only small preference for typical male toys [24]. Another threat can be regarded overstimulation of the child – we should learn to recognize and avoid it. What more toys can even shape nutritional habits – see Happy Meal case [25, 26].

Full understanding of normal growth and development in infants is key to provide appropriate stimulation enhancing motor and cognitive skills. This knowledge should be not only part of scientific research and publications, or clinical practice, but also normal preparation of parents and caregivers. Evaluation, selection (or creation) of appropriate toys will provide proper sets of stimulation. This way promotion and stimulation of infants motor skills, social development, and cognitive development will be possible simply through the wise use of toys. Variety of toys can cause quicker development of various skills such as and-eye co-ordination, manual dexterity or even such complex ability as recognition of cause-effect relationship [27, 28]. But building blocks were not proved as improving spatial skills

so far [29]. Dolls or toys may cause easier medical examination of infant. We should be aware that toy itself can constitute diagnostic tool [30].

There is need for newer toys nowadays – it seems attention span in infants and children becomes shorter, so toys should be more attractive. New toys will need for new tools assessing their influence (both positive and negative) to infants. This can be the main challenge for current scientists in the aforementioned area.

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