

Motor skills development and its relationship with personalities: A case study

Wings Tjing Yung Loo, Preston Corliss Loo and Mary Ngan Bing Cheung *

P and P Dental and Medical Sciences Ltd and Essence Medical Laboratory, Hong Kong.

Magna Scientia Advanced Research and Reviews, 2025, 14(01), 150-159

Publication history: Received on 14 May 2025; revised on 25 June 2025; accepted on 27 June 2025

Article DOI: <https://doi.org/10.30574/msarr.2025.14.1.0082>

Abstract

Physical development defines to physical changes in the body and involves changes in bone thickness, size, weight, gross motor, fine motor, vision, hearing, and perceptual development. Growth is rapid from birth to two years old. The child's size, shape, senses, and organs go through the change. The child obtains new skills during the first 12 months, physical development mainly engages the child's coordinating motor skills. The human brain begins forming very early in prenatal life, but in many ways, brain development is a lifelong mission. In this study a newborn baby has been invited to take part in this observational investigation. A serial of motor skill development was recorded from day 14 to 120. The observational results showed at scheduled days he could start to build up his personality and motor skills.

Well-educated parents tend to prepare a better plan to train and assess their infants making sure they have a good track of motor skills as well as brain development. Massaging the spine may strengthen the back muscles and allow the baby to sit up straight at an early stage. Being able to sit against his back the baby can visualize the environment around him. Encouraging or praising the baby to talk and communicate more with others or the outside world can help him learn some social skills.

Keywords: Motor skills; Reflex; Personality; Observational study; Social skills

1. Introduction

Physical development defines to physical changes in the body and involves changes in bone thickness, size, weight, gross motor, fine motor, vision, hearing, and perceptual development. Growth is rapid from birth to two years old. The child's size, shape, senses, and organs go through the change. When every item of the physical change occurs, the child obtains new skills. During the first 12 months, physical development mainly engages the child's coordinating motor skills. The infant repeats motor motions which serve to build physical strength and motor harmonization (Als, *et al.*, 2011; Jacobs, Sokol and Ohlsson, 2002; Lowe and Thomas, 2002; Piek, *et al.*, 2008; Souza, *et al.*, 2010). The babies at birth have reflexes as their only special one physical ability. A reflex is an automatic body response to a stimulus that is involuntary that a person cannot manage over this response. A reflex of blinking continues throughout life, and there are some other involuntary actions which take place in baby and may vanish a few weeks or months after birth. The presence of reflexes at birth is an indication of normal brain and nerve development. When normal reflexes are not present or if the reflexes continue past the time they should disappear, brain or nerve damage is suspected (Gerrard, *et al.*, 2025; Gerrard, *et al.*, 2025; Lowe and Thomas, 2002; Piek, *et al.*, 2008; Souza, *et al.*, 2010). The rooting and sucking reflex require for human survival. The rooting reflex lets children turn their head toward anything that brushes their faces. This survival reflex helps them to find food such as a nipple or dummy. When adults put a dummy near healthy infant's lips, the infant will begin sucking at once. The reflex also assists the child get food. This reflex usually disappears by three weeks of age (Als, *et al.*, 2011; Jacobs, Sokol and Ohlsson, 2002; Gerrard, *et al.*, 2025; Lowe and Thomas, 2002; Piek, *et al.*, 2008; Souza, *et al.*, 2010). The startle response appears in a newborn that he is startled by a noise or sudden movement. Acting of the startled, the baby reacts by throwing his arms and legs outward and extending the head. He then cries out loud and

* Corresponding author: Mary Ngan Bing Cheung

draws the arms together. This reflex grows in frequencies during the first month and generally disappears after two months (Antonis and Dimitra, 2025; Nurhandriatie, Dahlan and Budiman, 2025; Piek, *et al.*, 2008; Souza, *et al.*, 2010). The palmar grasp reflex when the child's palm is touched and when a rattle or another object is placed across the palm, he will grip tightly. This reflex disappears 3-4 months after birth (Payne and Isaacs, 2024; Pokoski, *et al.*, 2025; Holt, 1960; Illingworth, 1965; François and des Portes, 2004). A stepping reflex can also be viewed in normal and healthy babies. When the infant is held so that the feet are flat on a surface, he will lift one foot after another in a stepping motion. This reflex usually disappears 2 months after birth and reappears toward the end of the first year as learned voluntary behavior (Payne and Isaacs, 2024; Pokoski, *et al.*, 2025; Holt, 1960; Illingworth, 1965).

At birth, a baby's eyes could only see blurry images. He may try to focus an object at the center visual field during the first few weeks after birth. The closer vision is better developed than the long distant vision (Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009). He can focus on objects about 2 to 4 meters in front of them. The colorful object may draw his attention to vision. The baby likes to look the human face rather than other objects. At about 2 months of age, an infant prefers to look at a smiling face than at a face without any expression. From 2 to 3 months, the baby can easily focus a face that always take care of him into memory (Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009). Furthermore, the baby has been developing the auditory system in the earlier stage before birth, he can identify his mother's voice because he is familiar with her voice during pregnancy. The infant would turn his head towards a source or direction of sound and is scared by medium to loud noises (Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009). Newborn baby is also soothed to sleep by rhythmic sounds such as a lullaby or heartbeat. Infants will look around to locate or find sources of sounds, such as a song in the television. They also show response to a human voice while taking no notice of other competing sounds. A new born baby can discriminate his mother's and father's voices and the voice of a stranger by three weeks old. At three to six months, vocalizations begin to increase. He will increase his vocalizations when persons hold or play with him (Pradana, Sunardi and Susetyo, 2024; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009).

In this observational study the main focus is the motor skill development so that we understand more about motor development in infancy and how the brain interacts with environment (Als, *et al.*, 2011; Jacobs, Sokol and Ohlsson, 2002; Gerrard, *et al.*, 2025; Lowe and Thomas, 2002; Antonis, and Dimitra, 2025; Nurhandriatie, Dahlan and Budiman, 2025; Piek, *et al.*, 2008; Souza, *et al.*, 2010). Movement is one of the characteristic features of a living organism. The movements of human beings are controlled by the brain via the nervous system. Gross motor skills involve the use of large muscles in the legs and arms to create an action like jumping, clapping and throwing. Fine motor skills involve using small movements, like fingers grasping a piece of food, pushing toes to move toward a toy, rotating wrists and fingers to manipulate an object, and positioning the lips and tongue to babble and blow raspberries (Payne and Isaacs, 2024; Pokoski, *et al.*, 2025; Holt, 1960; Illingworth, 1965; François and des Portes, 2004; Als, *et al.*, 2011; Jacobs, Sokol and Ohlsson, 2002; Gerrard, *et al.*, 2025; Lowe and Thomas, 2002; Antonis and Dimitra, 2025; Nurhandriatie, Dahlan and Budiman, 2025; Piek, *et al.*, 2008; Souza, *et al.*, 2010).

The physical development happens in expected orders. The motor sequence for infants involves the following orderly sequence: 1) the infant will lift the head, watch a moving object by moving the head from side to side in 0-6 months; 2) the baby turns over from the tummy to the back first, then from back to tummy again when he is four or five months of age; 3) the baby could sit upright in a supporting chair that requires him to develop strength in the back and neck muscles at four to six months of age. He also gradually pulls himself into sitting positions; 4) after the child learns to turn over onto the tummy by pulling the arms and twisting the tummy; 5) the baby is able to sit without support; from the sitting position, he shifts his arms and legs, sliding the buttocks across the floor (Pradana, Sunardi and Susetyo, 2024; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009).

Changes and development of the motor sequence in early infant baby listed above include two main areas of development: the gross motor development suggests improvement of skills and control of the large muscles of the legs, arms, back and shoulders which are used in sitting and climbing; and the fine motor development proposes the use of the small muscles of the fingers and hands for activities such as grasping objects or holding (Pradana, Sunardi and Susetyo, 2024; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009).

The human brain begins forming very early in prenatal life, but in many ways, brain development is a lifelong mission. That is because the same events that shape the brain during development are also responsible for storing new skills and memories throughout life (Pradana, Sunardi and Susetyo, 2024; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009).

Many studies have been done, their results showed that well developed motor skills in infant stages would stimulate built up of sensory activities, as a result the child will get well perceptual and cognitive development in his future (Als, *et al.*, 2011; Jacobs, Sokol and Ohlsson, 2002; Gerrard, *et al.*, 2025; Lowe and Thomas, 2002; Antonis and Dimitra, 2025; Nurhandriatie, Dahlan and Budiman, 2025; Piek, *et al.*, 2008; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009; Souza, *et al.*, 2010). Some reports showed that massage or traditional Chinese massage may improve growth and nervous responses to infants. This could also give the baby better sleep which may affect growth and brain development (Susilowati, *et al.*, 2024; Agarwal, *et al.*, 2000; Vickers, *et al.*, 2004; Kelmanson and Adulas, 2006). This observational study records a serial development of an infant from day 14 to day 120 and some aspects of his personalities' build-up.

2. Methods

In this study a newborn baby "Jatsam" has been invited to take part in this observational investigation. Jatsam was born in United Kingdom on 10th August 2011, he came back to Hong Kong 14 days after birth. He has been living with his parents who were well-educated. His father obtained the bachelor degree in medicine, master and PhD in biomedical sciences. His mother is a dental surgeon who is also skillful in playing the piano having achieved Grade 8 in Examination of The Associated Board of the Royal School of Music. She has many years of experience in scientific paper writing and published a number of manuscripts. She read a lot of articles and books regarding baby's teaching during her pregnancy.

A serial of motor skill development was recorded from day 14 to 120. According to the motoscopic methods and motometric tests (Valentini, Vizzini and Minucci, 2025; Göllnitz, 1970; Neuhäuser, 1975a; 1975b), Jatsam has achieved gross motor skills of sucking the milk, grasping objects, stretching legs and sitting up straight and at later stage his fine motor skill was developed to grasp and hold the milk bottle. This study also took into account the auditory-verbal items of the boy according to Roe's suggestion (Roe, 1977; Sami, Ramzy and Tarek Orabi, 2025). His early personality of sense of security would be observed. Body massage was introduced to Jatsam since day 30 (1 month) to enhance the development of back muscles and stimulation of the spinal nerves (Susilowati, *et al.*, 2024; Agarwal, *et al.*, 2000; Vickers, *et al.*, 2004; Kelmanson and Adulas, 2006)

3. Results and discussion

In days 5-30, Jatsam's fingers could only stretch gently when holding his parents' finger (Figure 1). His legs stretched very well and sucked the dummy with proper force. He opened his eyes and identified the objects not so well, so he mainly listened to others' voices. His mother talked to him in English and Cantonese while his father only talked to him in Mandarin. He spent 16-18 hours sleeping every day.



Figure 1 Jatsam's fingers could only stretch gently



Figure 2 Jatsam's fingers could hold the bottle tighter

In days 30-60, Jatsam's fingers could stretch and he could hold the parents' finger or bottle tighter than before (Figure 2). His legs stretched as if he was riding a bicycle and he sucked the dummy harder than the early stage. He listened to his mother talking and smiled when his mother spoke to him (Figure 3a, 3b). However, when his father spoke to him he did not respond much. He could sit up straight and still he spent 16-18 hours sleeping every day.



Figure 3a He listened to his mother talking



Figure 3b He smiled when his mother spoke to him

In days 60-90, Jatsam's fingers could hold his parents' finger or bottle properly. His legs bent and stretched more rapidly and he sucked the dummy in and out harder. He listened to his mother talking to him and smiled but at this stage he also responded with voices when his mother spoke to him (Figure 3c). He tended to respond better to his father's talking. He liked watching the television with colourful programmes and was attracted by strange sounds (Figure 3d).



Figure 3c He could respond with voices when his mother spoke to him



Figure 3d He liked watching the television with colourful programmes

In days 90-120, Jatsam fingers' could hold the bottle or light objects with an even larger force (Figure 4a and 4b). He listened to his mother talking and responded vocally, sometimes he even made funny faces with different facial expressions (Figure 4c). He also responded vocally when his father was talking to him in Mandarin. However, their parents have observed that he only spoke loud with parents or people who are always around him. When he met strangers or people he seldom saw, he would keep quiet let alone cry. He could sit up straight without help and support his upper body by resting on his tummy and raise his head (Figure 4d).



Figure 4a His fingers could hold the bottle with an even larger force



Figure 4b His fingers could hold the light objects with an even larger force



Figure 4c He listened to his mother talking and responded vocally, he made funny faces with different facial expressions



Figure 4d He could sit up straight without help and support his upper body by resting on his tummy and raise his head

Jatsam started to build up his personality, he likes to taste sweet food such as cream cakes and if he sees his parents eat he would ask for it by making sounds or gesture (Figure 5a). He likes taking photos so whenever he sees people holding a camera facing him he always smiles (Figure 5b). Since day 60 he preferred to be cared and carried by her mother in the evening because of the sense of security. If he sensed that his mother was not around he would cry loudly or screamed to show his anger or unhappiness (Figure 5c).



Figure 5a He likes to taste sweet food and he would ask for it by making sounds or gesture

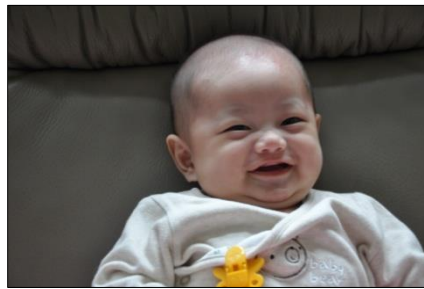


Figure 5b He likes taking photos and he sees people holding a camera facing him he always smiles



Figure 5c He sensed if his mother was not around, he would cry loudly or screamed to show his anger or unhappiness

The gross motor skills started to build up from birth. The strength of these skills increased from day to day as the child is growing. The fine motor skills such as holding the plastic chain, milk bottle or light objects begin to establish after those. The grasping force of Jatsam's hands and legs increased day by day. He gradually built up the ability to identify or grade important people around him, for example, mother is the most important person, grandmother is next followed by father or grandfather and so on. He also started to select food that he favours although his main diet was still milk. He likes to hold or play with colourful toys and he made sounds at various pitches when watching television (baby language).

4. Discussion

The baby in this observation has been developing gross and fine motor skills that fit into researchers' findings as early years of life are a time of implausible growth and learning. The realization of the rapid changes in an infant's developmental status prepares parents to give dynamic and determined attention to the 0-5 years old children and to guide and promote early learning that will serve as the basis for later learning. Having knowledge in child development is an essential element for teaching young children (Als, *et al.*, 2011; Jacobs, Sokol and Ohlsson, 2002; Gerrard, *et al.*, 2025; Lowe and Thomas, 2002; Souza, *et al.*, 2010).

Jatsam's parents and grandparents give him much attention and care that boost up his growth which is similar to previous reports that the development of motor proficiency during infancy and childhood is dependent upon and influenced by the growth and maturity characteristics of the child interacting with the environment, such as the family members and peer group, in which a child is reared (Education, 2025; Malina, 2004; Pradana, Sunardi and Susetyo, 2024; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009). Jatsam recognized familiar faces and he also presented good abilities to speak to family members. He developed gross motor skills well stimulating the brain growth as reported by some scientists that environmental chances and limitations for movement interact with the biological elements of growth and maturation to determine the motor stock of the child. The reports mention motor development during infancy and early childhood and emphasizes numerous specific areas and questions: critical evaluation of stages for specific movement patterns; extension of the dynamical systems framework; genetic aspect involvements to motor development; metabolic and physiological correlates of motor development; relationship of motor development to the growth of the brain, status at birth and early postnatal growth (Education, 2025; Malina, 2004; Pradana, Sunardi and Susetyo, 2024; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009).

Jatsam's parents were willing to take part in this investigation to present a real and follow up model in a close distance to observe the changes of an infant's growth according to other reports of the assessment and recording of motor skills movement patterns in children in relation to brain development (Als, *et al.*, 2011; Jacobs, Sokol and Ohlsson, 2002; Gerrard, *et al.*, 2025; Lowe and Thomas, 2002; Education, 2025; Malina, 2004; Souza, *et al.*, 2010). Even though this is a very small scaled observational study, the genuine data and judgment of motor behavior recorded of this boy are important tools to provide small portions of developmental and neuropsychiatric diagnosis in the future because during infancy and early childhood the developmental course of various motor functions has to be registered, and the alterations of spontaneous or provoked movements have to be assessed by neuropsychiatric evaluation (Valentini, Vizzini and Minucci, 2025; Göllnitz, 1970; Neuhäuser, 1975a; 1975b; Roe, 1977; Pradana, Sunardi and Susetyo, 2024; Santrock, 2014; Boyd and Bee, 2009; Newman and Newman, 2009; Papalia, Olds and Feldman, 2009). The massage given to Jatsam might have helped to make him learn to sit at a stage earlier than other children at the same age. The earlier he learns to sit up straight, the more he could observe around him. As a result, viewing what is happening in the world around him may stimulate his memory and language system (Susilowati, *et al.*, 2024; Agarwal, *et al.*, 2000; Vickers, *et al.*, 2004; Kelmanson and Adulas, 2006). On the other hand, however, his sense of security to select only people he recognizes or prefers may prohibit him from contacting or interacting with other people. His parents should pay more attention to improve in this aspect.

5. Conclusion

Well-educated parents tend to prepare a better plan to train and assess their infants making sure they have a good track of motor skills as well as brain development. Both gross and fine motor development in infancy correlate with the maturation of the developing neuro-system and personalities. Early verbal communication to the infant would encourage him to communicate with the outside world at an earlier age. Massaging the spine may strengthen the back muscles and allow the baby to sit up straight at an early stage. Being able to sit against his back the baby can visualize the environment around him. Encouraging or praising the baby to talk and communicate more with others or the outside world can help him learn some social skills.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

- [1] Agarwal, K.N., Gupta, A., Pushkarna, R., Bhargava, S.K., Faridi, M.M., Prabhu, M.K. (2000). Effects of massage and use of oil on growth, blood flow and sleep pattern in infants. *Indian J Med Res*, 112, 212-7.
- [2] Als, H., Duffy, F. H., McAnulty, G. B., Fischer, C. B., Kosta, S., Butler, S. C., ... and Ringer, S. A. (2011). Is the Newborn Individualized Developmental Care and Assessment Program (NIDCAP) effective for preterm infants with intrauterine growth restriction?. *Journal of Perinatology*, 31(2), 130-136.
- [3] Antonis, T., and Dimitra, K. (2025). Developmental Motor Coordination Disorder Gross and fine motor skills of preschool, school-age and adolescent children. *Clinical Research and Clinical Trials*, 12(5).
- [4] Education, C. (2025). Physical and Motor Development in Early Childhood Education.
- [5] François, L.L. and des Portes, V. (2004). The main stages of psychomotor development from 0 to 3 years of age. *Rev Prat*, 54, 1991-7.
- [6] Gerrard, J., McCaw, C. T., Zonca, B., Cabiles, B., and Martinussen, M. (2025). Parental rights and state concerns: the policy problematisation of home education. *Journal of Education Policy*, 1-20.
- [7] Göllnitz, G. (1970). Development of motoricity as functional-neurologic diagnosis. *Psychiatr Neurol Med Psychol Beih*, 13-14, 49-61.
- [8] Holt, K.S. (1960). Early motor development. Posturally induced variations. *Pediatr*, 57, 571-5.
- [9] Illingworth, R.S. (1965). The sequence of development of the child. *Physiotherapy*, 51, 176-8.
- [10] Jacobs, S.E., Sokol, J., Ohlsson, A. (2002). The Newborn Individualized Developmental Care and Assessment Program is not supported by meta-analyses of the data. *J Pediatr*, 140, 699-706.
- [11] Kelmanson, I.A and Adulas, E.I. (2006). Massage therapy and sleep behaviour in infants born with low birth weight. *Complement Ther Clin Pract*, 12, 200-5.
- [12] Lowe, J. and Thomas, A. (2002). Educating Children at Home. *Continuum International Publishing Group, London*.
- [13] Malina, R. M. (2004). Motor Development during Infancy and Early Childhood: Overview and Suggested Directions for Research. *Int. J. Sport Health Sci*, 2, 50-66.
- [14] Neuhäuser, G. (1975a). Methods of assessing and recording motor skills and movement patterns. *Dev Med Child Neurol*, 17, 369-86.
- [15] Neuhäuser, G. (1975b). The value of motor tests in neuro-developmental diagnosis. *Fortschr Med*, 93, 1159-66.
- [16] Nurhandriatie, L., Dahlan, T. H., and Budiman, N. (2025, April). Development of an Early Childhood Assessment Instrument Focus on Gross Motor, Fine Motor, and Cognitive Skills. In *Proceeding of International Seminar On Student Research In Education, Science, and Technology* (Vol. 2, pp. 63-68).
- [17] Pradana, R. S., Sunardi, S., and Susetyo, B. (2024, May). Concept of Child Development Theory Based on Perceptual and Motor Domains. In *Proceeding of International Conference on Special Education in South East Asia Region* (Vol. 3, No. 1, pp. 42-47).
- [18] Payne, V. G., and Isaacs, L. D. (2024). *Human motor development: A lifespan approach*. Routledge.
- [19] Piek, J.P., Dawson, L., Smith, L.M., Gasson, N. (2008). The role of early fine and gross motor development on later motor and cognitive ability. *Hum Mov Sci*, 27, 668-81.
- [20] Pokoski, O. M., Furnier, S. M., Gangnon, R. E., Howerton, E. M., Kirby, A. V., Prothro, T., ... and Durkin, M. S. (2025). Prevalence of Motor Milestone Delays in Autistic Children. *JAMA pediatrics*.
- [21] Roe, K.V. (1977). Correlations between Gesell scores in infancy and performance on verbal and non-verbal tests in early childhood. *Percept Mot Skills*, 45(3 Pt 2), 1131-4.
- [22] Sami, R., Ramzy, S., and Tarek Orabi, G. (2025). Assessment of verbal and nonverbal cognitive abilities in children with stuttering using 5th edition Stanford Binet. *Applied Neuropsychology: Child*, 1-8.

- [23] Santrock, J. (2014). Ebook: Child Development: An Introduction. McGraw Hill.
- [24] Souza, C.T., Santos, D.C., Tolocka, R.E., Baltieri, L., Gibim, N.C., Habechian, F.A. (2010). Assessment of global motor performance and gross and fine motor skills of infants attending day care centers. *Rev Bras Fisioter*, 14, 309-15.
- [25] Susilowati, L., Arifianto, I., Reflisiani, D., and Herdyana, E. (2024). The influence of infant massage on the sleep duration of infants aged 6-12 months in TPMB X, Jagakarsa Sub-District, Srengseh Sawah Village. *International Journal of Health and Medical Sciences*, 7(2), 17-25. <https://doi.org/10.21744/ijhms.v7n2.2270>
- [26] Valentini, M., Vizzini, M., and Minucci, M. (2025). The role of the body in learning and development of the Child. *Formazione and insegnamento*, 23(1), 1-xx.
- [27] Vickers, A., Ohlsson, A., Lacy, J.B., Horsley, A. (2004). Massage for promoting growth and development of preterm and/or low birth-weight infants. *Cochrane Database Syst Rev*, 2, CD000390