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Motor Development in Infants: A Literature Review on The Role of Exclusive Breastfeeding and Early Stimulation

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ABSTRACT

Motor development in infancy is the basis for movement skills in the next stage, so the factors that affect it are important to understand, especially by health workers and educators involved in stimulating children's growth and development. This review aims to summarize and compare evidence from scientific articles on the role of nutrition, early stimulation, and other factors on the motor development of infants aged 0-12 months in Indonesia. The method used was a literature review with a narrative approach to 20 national journal articles published between 2020 and 2026, selected through a search of scientific databases with keywords such as motor development, exclusive breastfeeding, baby massage, baby gym, and baby spa; the data of each article was extracted into a table and synthesized based on theme. The results of the review showed that all five articles discussing exclusive breastfeeding reported a meaningful association with body length growth and with infant motor development, although the association with head circumference was not always meaningful. Infant massage, baby gym, baby spa, and a combination of them were reported to improve motor development in all nine intervention studies reviewed, with sessions lasting approximately 15-20 minutes for approximately one month. A history of preterm birth, long shading, and lack of opportunities for free movement were associated with less age-appropriate motor development, while stimulation accompanied by physiotherapy facilitation was shown to accelerate growth and development in previously delayed infants. The strength of the evidence is still limited by small sample sizes, small control groups in intervention studies, and cross-sectional designs in most nutrition studies. Research with a more robust design, such as randomized controlled trials, is needed to ensure the optimal effect and dose of stimulation for infant motor development.

Keywords: motor development, babies, exclusive breastfeeding, baby gym, baby massage

INTRODUCTION

Infancy is often called the golden age because growth and development are so rapid and cannot be repeated (Simanjuntak & Wahyuning Tyas, 2025) . One of the most easily observed aspects of this period is motor development, which is an increase in body structure and function as a result of the interaction between the central nervous system and skeletal muscles (Suwarni Winingsih, Nurul Halimah, Puspo Wardoyo, 2022). Motor development is differentiated into gross motor, which involves large muscles such as uprighting the head, sitting, and standing, and fine motor, which involves small muscles and careful coordination such as grasping and grabbing (Nasution et al., 2025; T Prianti et al., 2021).

Motor skills are not just a matter of moving. Haryanti and Wulan (2023) called motor movements as the foundation for children's play, learning, socializing, and self-confidence. Winingsih et al. (2022) He added that optimal motor growth and development are influenced by the stimulus that the baby receives as well as the biological potential he has, and both will interact with genetic, biopsychosocial, and behavioral factors. From the perspective of sports,

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it can be understood that the quality of fundamental movement formed in infancy also determines the provision of children's movements in the next stages.

In Indonesia, developmental disorders in infants and toddlers are still found with varying numbers between sources. Simanjuntak and Tyas (2025) quoting Riskesdas 2023 that 16.6% of children have development that is not in accordance with their age, while Haryanti and Wulan (2023) citing the prevalence of fine and gross motor disorders in toddlers at 25%. The difference in numbers is likely influenced by the region, age group, and measuring instrument used. Age-appropriate development is associated with obstacles in socializing and learning later in life (Simanjuntak & Wahyuning Tyas, 2025).

Motor development is influenced by many factors. Winingsih et al. (2022) grouping them into genetic factors, biopsychosocial factors, and behavioral environmental factors, both during pregnancy and after birth, including nutrition, stimulation, and physiotherapy facilitation. In the article reviewed in this paper, the two factors that are most discussed are nutrition, especially exclusive breastfeeding (Ate et al., 2026; Sa'diyah et al., 2025), and stimulation, both in the form of touch such as baby massage and active movements such as *Baby Gym* (Febrina et al., 2026; Kornalia et al., 2023). On the other hand, there are also parenting practices that actually limit the baby's movements, such as prolonged swaddling and the habit of putting the baby in the *baby walker* (Evi ayu Purnamasari, Triana Indrayani, 2023).

The articles are scattered in various journals with different designs, sample ages, and instruments, so the overall picture is not easy to see, especially by readers from the field of sports who are interested in movement stimulation. This review aims to summarize and compare the findings of 20 articles on nutritional factors, early stimulation, and other factors related to the motor development of infants aged 0-12 months, as well as assess the strength of the available evidence.

METHOD

This research is a *literature review* with a narrative approach, because the articles analyzed have diverse designs, forms of interventions, and instruments so that the data cannot be combined statistically as in the meta-analysis; the data source is in the form of 20 articles from national scientific journals published between 2020 and 2026. The article search was carried out through the Google Schoolar database and the garuda portal in the period from September 15 to October 2, 2026 using a combination of keywords such as "motor development in babies", "motor stimulation", "exclusive breastfeeding", "baby massage" and "baby gym". and was selected based on the following criteria: (1) discussing motor development in babies aged 0-12 months; (2) in the form of research articles or literature studies published in journals or proceedings; (3) available in full text; (4) published in 2020 or later; and (5) with an Indonesian background; Each article was read in full, then the important information was extracted into a table containing the author and year, sample design and number, infant age, exposure or intervention, developmental assessment instrument, and main outcomes (Table 1), and then synthesized narratively based on the common theme, namely (1) exclusive breastfeeding, (2) infant massage, (3) *baby gym* or infant gymnastics, (4) *baby spa* and combination stimulation, and (5) other factors and physiotherapy facilitation, with the strength of the evidence assessed descriptively based on the study design, sample size, the presence or absence of a control group, and the instrument used.

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RESULTS AND DISCUSSION

Presentation of Results

The twenty articles reviewed consisted of six *cross-sectional studies*, twelve pseudo-experimental or pre-experimental studies, and two literature studies. The number of samples ranged from 7 to 137 infants or children. The most widely used instrument to assess motor development was the Pre-Screening Developmental Questionnaire (KPSP), followed by *the Denver Developmental Screening Test* (DDST) or Denver II; some articles in the form of literature studies did not use their own measurement instruments. Five articles examined exclusive breastfeeding, nine articles examined stimulation interventions in the form of baby massage, *baby gym*, *baby spa*, or a combination thereof, five articles discussed infant massage specifically including its relation to a history of prematurity, and two other articles discussed swaddling and stimulation accompanied by physiotherapy facilitation. A summary of each article is presented in Table 1.

Table 1. Summary of the Reviewed Articles

Yes	Author (year)	Design, samples, and age of babies	Exposure or intervention; instruments	Main results
A. Exclusive nutrition and breast milk				
1	(Ate et al., 2026)	*Cross-sectional*; 50 infants aged 0-6 months	Exclusive breastfeeding; DDST II	Normal motor 93.3% (exclusive breast milk) vs 70.0% (no); p=0.047.
2	(Nasution et al., 2025)	*Cross-sectional*; infants >6 months of age	exclusive breastfeeding; fine motor	There is an exclusive relationship between breast milk and fine motor (Fisher test, p=0.015).
3	(Sa'diyah et al., 2025)	*Cross-sectional*; 137 children aged 6-24 months	Exclusive breastfeeding; KPSP	Relationship means exclusive breast milk with gross motor skills; p=0.000.
4	(Rahma et al., 2021)	*Cross-sectional*; 36 infants aged 6-9 months	exclusive breastfeeding; body length, head circumference	Body length: p=0.025 (meaningful). Head circumference: p=0.822 (meaningless).
5	(Siti Maemunah, 2021)	*Cross-sectional*; 100 infants aged 1-6 months	exclusive breastfeeding; nutritional status, Denver II	Nutritional status: p=0.000; OR=81.4. Development: p=0.000; OR=18.5.
B. Baby massage				
6	(Kornalia et al., 2023)	Pseudo-experiments; 30 3-month-old babies (15 massaged, 15 not)	*Baby massage*; KPSP	Developing according to the stages 53.3% (massaged) vs 20.0% (not massaged); p=0.016.
7	(Simanjuntak & Wahyuning Tyas, 2025)	Pseudo-experiment with controls; 40 infants aged 1-12 months (20/20)	15-minute massage, 3 times in 1 month; KPSP	All infants in the normal massage group after the intervention; 3 infants were doubtful at the control unchanged; p=0.002.

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8	(Yanti et al., 2022)	*One group pretest-posttest*; 17 infants aged 0-3 months	Massage 4 times in 1 month; KPSP	Categories fit 12 → 15 babies; doubtful 5 → 2; p=0.018.
9	(Ita Haryanti, 2023)	*Cross-sectional*; 107 infants aged 3-6 months	History of massage and history of prematurity; Denver II	Massage (p=0.000) and history of prematurity (p=0.014) were associated with gross motor skills; 52.4% of infants who were not massaged were *caution* vs 2.3% of infants who were massaged.
10	(T Prianti et al., 2021)	Experiment; infants aged 3-6 months, Antang Makassar Health Center	Baby massage; motor development	The effect of infant massage on motor development (Wilcoxon test, p=0.000).
C. Baby gym or baby gymnastics				
11	(Evi ayu Purnamasari, Triana Indrayani, 2023)	*One group pretest-posttest*; 20 infants aged 6-9 months	*Baby gym* 15 minutes, 2 times/week, 4 weeks; KPSP	Average score 7.65 → 9.40; all babies improved; p=0.000.
12	(Prameswari et al., 2023)	Pre-experiment *one group*; 7 infants aged 6-9 months	*Baby gym* 3 times/week, 4 weeks; KPSP	The average score was 7.71 → 9.14 (up 18.5%); p=0.001.
13	(Andinawati et al., 2022)	One group pre-experiment; 30 infants aged 9-12 months	*Baby gym*; KPSP	Effect of baby gym means on motor development; p=0.000.
14	(Febrina et al., 2026)	Pseudo-experiment with controls; 40 infants aged 6-9 months (20/20)	*Safe* and hygienic baby gym, 15-20 minutes, 2-3 times/week, 4 weeks; KPSP	Score increase of +1.90 (intervention) vs +0.45 (control); p<0.001. Compliance correlated with an increase in score (r=0.62; p=0.004).
15	(Ririn Anggraini & Tiara Fatrin, 2022)	Literature studies; 6 national articles	Baby gymnastics	Infant exercise affects the motor skills of babies 3-12 months; supine and prone positions, 10-15 minutes, 2 times/week.
D. Baby spa and combination stimulation				
16	Dahlan et al. (2021)	Quasi-experiment with controls; infants aged 3-6 months	*Baby spa*; developmental observation	Dubious category 33.3% → 6.7%; influence is statistically significant.

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17	(Retnaningsih & Purwanti, 2023)	Pre-experiment *one group*; 20 infants aged 3-6 months	*Baby massage* dan *gym*; Denver II	*Caution* 4 → 0; normal 13 → 16; *advance* 3 → 4; p=0,025.
18	(Retno Setyo Iswati, Dita Sasmita, 2025)	Two-group quasi-experiment; 34 infants aged 3-6 months (17/17)	*Baby massage* vs *baby gym*, 20 minutes, 2 times/week, 4 weeks; Denver II	Both improved development (p=0.000); there was no difference between groups (p=0.454).
E. Other factors and physiotherapy facilitation				
19	(Romadlona et al., 2024)	Literature studies; 8 national articles (2018-2024)	Newborn shading	Swaddling improves body temperature and sleep quality, but slows down gross motor development due to limited movement.
20	(Suwarni Winingsih, Nurul Halimah, Puspo Wardoyo, 2022)	*One group pretest-posttest*; 21 infants aged 0-12 months	Physiotherapy stimulation and facilitation	16 of 21 infants (76.2%) were initially late; 14 infants (66.7%) experienced acceleration after the intervention; p=0.001.

Description: KPSP = Pre-Screening Questionnaire; DDST = Denver Developmental Screening Test; Complementary Foods = Complementary Foods for Breast Feeding; OR = Odds Ratio.

Exclusive Breastfeeding and Motor Development

Five articles examined exclusive breastfeeding and all found a meaningful association with infant motor growth or development, although the measured domains varied. Ate et al. (2026) in 50 infants aged 0-6 months in Medan found that 93.3% of infants who received exclusive breastfeeding developed normal motor skills according to DDST II, compared to 70.0% in infants who did not (p=0.047). Sa'diyah et al. (2025) in 137 children aged 6-24 months in Tuban found a meaningful association between exclusive breastfeeding and gross motor development according to KPSP (p=0.000), while Nasution et al. (2025) found a meaningful association with fine motor skills in infants over six months (Fisher test, p=0.015).

Two other articles assess physical growth as an indicator related to nutrition and development. Rahma et al. (2021) in 36 infants aged 6-9 months in Palembang found a meaningful association between exclusive breastfeeding and body length growth (p=0.025), but not with head circumference (p=0.822). Maemunah and Sari (2021) in 100 infants aged 1-6 months in Cilegon, using Denver II, found a meaningful association between exclusive breastfeeding and nutritional status (p=0.000; OR=81.4) and development (p=0.000; OR=18.5), meaning that infants who did not receive exclusive breastfeeding were 18.5 times more likely to develop in the doubtful category.

The biological explanation proposed by the authors revolves around the content of breast milk. Sa'diyah et al. (2025) mention DHA, AA, and protein as substances that support the development of the nervous and muscular system, while Rahma et al. (2021) and Maemunah and Sari (2021) both emphasize that breast milk contains complete nutrients with a composition that meets the needs of the baby and is not replaced by formula milk. Ate et al. (2026) adds the role of choline and other bioactive components in the process of myelination

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and neuromuscular coordination, while Nasution et al. (2025) highlighting that breastfeeding also provides stimulation in the form of physical contact and mother-baby interaction, so the benefits are not solely about nutritional content.

There are several things that need to be observed. The five studies were designed to be cross-sectioned so that they only showed relationships, not causes, and other factors such as parental stimulation and genetics were not controlled. Ate et al. (2026) themselves noted that a small number of babies who received exclusive breastfeeding remained in the abnormal category, on the other hand, some babies who did not receive exclusive breastfeeding actually developed normally, and concluded that motor development is influenced by many factors. Nasution et al. (2025) itself reported the number of samples and the inconsistent proportions between the abstract and the results table, so the detailed figures were not referenced in this review except for consistent p-values. Results in Rahma et al. (2021) It also shows that not all growth indicators are meaningfully related to exclusive breastfeeding: body length is meaningful, but head circumference is not, suggesting that physical growth and motor development do not always change simultaneously on each indicator.

Baby Massage

Infant massage was studied in five articles. Three experimental studies with a comparison group showed similar results. Kornalia et al. (2023) Comparing 15 infants aged 3 months who were massaged with 15 infants who did not: infants who were massaged developed more according to stages (53.3% versus 20.0%), while 46.7% of infants without massage were categorized as likely to have deviations (p=0.016). Simanjuntak and Tyas (2025) involving 40 infants aged 1-12 months; after 15-minute massage three times a month, all infants in the intervention group were in the normal category, while three infants in the control group had no change (p=0.002). Prianti et al. (2021) in infants aged 3-6 months at the Antang Health Center, Makassar, found a significant effect between infant massage and motor development using the Wilcoxon test (p=0.000), with most babies developing normally after massage.

The other two articles did not use separate control groups. Yanti et al. (2022) In 17 infants aged 0-3 months without a control group, the number of babies in the appropriate category increased from 12 to 15 after four massages in one month (p=0.018). In the study of cross-cutting in OKU, Haryanti and Wulan districts (2023) In 107 infants aged 3-6 months, it was found that 52.4% of infants who had never been massaged were categorized as *Deposit* compared to 2.3% of infants who had been massaged (p=0.000); the same study also found that a history of preterm birth was associated with less appropriate gross motor development (p=0.014), with 56.5% of premature infants in the category *Deposit* compared to 25.0% of non-premature babies.

The mechanisms presented in these articles are mostly theoretical. Touch on the skin stimulates nerve endings that transmit signals to the brain through the spinal cord (Yanti et al., 2022), improve circulation and oxygen distribution, and stimulate the vagus nerve so that nutrient absorption improves. Haryanti and Wulan (2023) adding that premature babies often have drinking difficulties and immature digestive organs so that nutritional needs are undermet and movement activity is limited, and argues that regular infant massage may be one way to stimulate premature babies, although their research did not test this directly. These explanations make sense, but almost none of the reviewed articles measured these physiological variables directly, as they are generally measured only developmental scores or categories. Therefore, these mechanisms should be read as hypotheses, not findings.

The safety aspect also needs to be considered. Kornalia et al. (2023) Remind that incorrect massage can cause bruising, pain, and injury, and that baby massage guidelines are

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different from some traditional massage practices, for example there is no massage on the head. Therefore, massage should be done by trained personnel or by a mother who has been guided.

Baby Gym or Baby Gymnastics

Baby gym Baby gymnastics can be understood as structured movement activities that stimulate balance, coordination, and muscle strength of babies through multisensory stimuli (Febrina et al., 2026). Four intervention studies that specifically examined *Baby Gym* and one literature study points in the same direction. Purnamasari et al. (2023) give *Baby Gym* 15 minutes, twice a week for four weeks, in 20 infants aged 6-9 months with dubious gross motor status; the average KPSP score increased from 7.65 to 9.40 and all infants improved (p=0.000). Prameswari et al. (2023) reported an increase in the mean score from 7.71 to 9.14 (p=0.001) in seven infants after 12 sessions. Andinawati et al. (2022) in 30 infants aged 9-12 months at the Independent Practice of Midwives Putri Indriani, Cibinong, with a pre-experimental design of one group, also found a meaningful effect (p=0.000). Febrina et al. (2026) using the control group and finding an increase in the group's score *Baby Gym* (+1.90) was much larger than controls (+0.45; p<0.001).

Improvements in the research of Purnamasari et al. (2023) appeared in the KPSP items that were directly related to muscle work and coordination. Infants who had not been able to sit on their own for 60 seconds dropped from eight to four, infants who had not been able to support part of their weight with both legs when lifted to a standing position dropped from ten to zero, and infants who had not been able to hold one cube in each hand dropped from eight to one. In Febrina et al. (2026), the session includes *tummy time*, rolling, sitting with assistance, and hand and eye coordination exercises, with parental assistance and stopping sessions when the baby seems uncomfortable or tired.

Anggraini and Fatrin (2022) The study of six articles concluded that infant exercise had an effect on the motor development of infants aged 3-12 months, with movements in the supine and prone positions, lasting 10-15 minutes, twice a week, in the morning and evening. However, the duration of the sessions in the articles they reviewed actually ranged from 10 to 30 minutes and none of the articles in this review compared doses directly. Therefore, the frequency and duration were more accurately seen as a common practice, rather than a proven optimal dose.

Safe and hygienic implementation seems to play a role. In Febrina et al. (2026), 15 out of 20 infants (75%) underwent sessions with good adherence to safety and hygiene procedures, and the better the adherence, the greater the improvement in motor scores (r=0.62; p=0.004). A total of 85% of the infants experienced no adverse events, the rest had only mild fuss (10%) or mild skin irritation (5%), and there were no serious injuries. These findings are in line with the general principle of physical exercise that the quality of implementation and supervision determines outcomes.

There is one important note about the design. The control group in Febrina et al. (2026) also experienced an average score increase of 0.45 points, although it was not significant (p=0.072). This is a reminder that some of the changes in studies without the control group, such as Purnamasari et al. (2023), Prameswari et al. (2023), and Andinawati et al. (2022), may have come from the natural maturity of the infants during the study period and not solely from interventions.

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Baby Spa and Combination Stimulation

Dahlan et al. (2021) examined *baby spas* in infants aged 3-6 months in East Jakarta with a pseudo-control group experiment design. In the group undergoing *baby spa*, the number of babies in the dubious category decreased from 10 babies (33.3%) before the intervention to 2 babies (6.7%) afterwards, and bivariate analysis showed a statistically significant influence on the motor development of infants aged 3-6 months. The authors explain that in water the gravitational effect is very low so that babies can move more freely than just playing on the floor.

Retnaningsih and Purwanti (2023) combining massage and *Gym* in 20 babies aged 3-6 months. Categories *Deposit* dropped from four babies to none, the normal category went up from 13 to 16 babies, and *Advance* from three to four infants (p=0.025). Iswati et al. (2025) compare massage and *Baby Gym* directly in 34 infants aged 3-6 months (17 infants per group, twice a week, 20 minutes, for four weeks). Both groups improved significantly (p=0.000 in each group), but there was no difference between groups (p=0.454). In other words, in the study both forms of stimulation were equally beneficial and neither was shown to be superior.

A possible explanation is that the regularity of tactile and movement stimuli given and parental involvement play a role, not the form of stimulation, although this is not tested in the article. Retnaningsih and Purwanti (2023) adding that mother-infant interaction during stimulation also trains personal-social, communication, and language skills. These two articles also explain that stimulation can increase dendrite branching and the complexity of the V neuron layer in the cerebral homunculus (Retnaningsih & Purwanti, 2023). The explanation is theoretical and not directly measured.

Other Factors and Physiotherapy Facilitation

Sneezing. Romadlona et al. (2024) examined eight articles on newborn swaddling in Indonesia published between 2018 and 2024. They concluded that swaddling has benefits in the form of increased body temperature, improved sleep quality, and comfort for babies, but on the other hand slows down gross motor development because babies do not have the opportunity to move freely and receive movement stimulation from the environment. One of the articles they reviewed, a study on 3-month-old babies in Sukoharjo, found that babies who were swaddled for 30 to 45 days were fully developed normally, while babies who were swaddled for 75 days or more were all suspect. Another article they examined also reported that babies who were swaddled for a short period of time tended to develop normal gross motor skills, while those who were swaddled for a long time tended to develop abnormally at the age of 3 months. Romadlona et al. (2024) added that the assumption that swaddling can straighten a baby's leg is not supported by scientific evidence, because the shape of a newborn's leg will adjust to be straight as it grows, not because it is swaddled or not.

Parenting patterns that limit movement. A similar pattern, namely reduced opportunities for free movement, is also suspected by Purnamasari et al. (2023), which observed that mothers often put their babies in *baby walker* when busy or continuing to carry it, and do not yet know the benefits *Baby Gym*. Yanti et al. (2022) also attributes dubious development before massage to lack of stimulation.

Stimulation and facilitation of physiotherapy. Winingsih et al. (2022) examined the effect of stimulation accompanied by physiotherapy facilitation in 21 infants aged 0-12 months with a pretest-posttest group design. At the beginning of the study, 16 of 21 infants (76.2%) experienced delayed motor growth and development. After being given stimulation and physiotherapy facilitation, 14 infants (66.7%) experienced accelerated growth and development, with an average score increase of 7.5 (p=0.001). The authors explain that optimal

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motor growth and development is influenced by the stimulus the infant receives and the biological potential it has, which interacts with genetic, biopsychosocial, and behavioral environmental factors. These findings show that even infants who have experienced delays can still show significant improvement through directed stimulation, although this study did not have a control group so the role of natural maturity cannot be completely separated from the intervention role.

Table 2. Summary of Findings by Stimulation Theme

Stimulation Theme	Number of Articles	Measurement Focus	Summary of Findings
Exclusive breastfeeding	5	Growth in body length and motor development	All reported meaningful relationships, except for the head circumference in one article.
Baby massage	5	Gross and fine motor development; link to a history of prematurity	All report meaningful influences or relationships.
Baby gym / baby gymnastics	5	Motor development, especially gross motor	All reported a significant increase in scores.
Baby spa and combination stimulation	3	Combined motor development	All reported improvements; there was no significant difference between massage and baby gym in a single article.
Other factors and physiotherapy facilitation	2	Sneezing; stimulation in babies with delays	Long swings are associated with delays; stimulation and physiotherapy accelerate improvement.

Note: this table summarizes the direction of the findings in this review and is illustrative; details of the methods and results of each study follow Table 1.

Strength of evidence and limitations

Overall, almost all articles reported meaningful associations or influences on infants' motor growth or development. These similarities are corroborating, but the strength of the evidence is limited in several respects. First, the intervention studies were small-scale, with a sample of 7 to 40 infants. Second, only four of the nine intervention studies (Kornalia et al., 2023; Simanjuntak & Tyas, 2025; Dahlan et al., 2021; Febrina et al., 2026) compared the results with the non-intervention group, whereas the control group in Febrina et al. (2026) still experienced an average score increase of 0.45 points without intervention. Third, measurements using screening instruments, namely KPSP and DDST, which are designed to detect delays and not to measure changes in motor ability in detail. Fourth, the observation time is short, generally about one month, so it is not yet known whether the benefits last.

Research on exclusive breastfeeding and shading is entirely in the form of a cross-cutting design or in the form of a literature review from cross-cutting research, so it cannot show cause and effect. In addition, Nasution et al. (2025) reported the number of samples and the different proportions between the abstract and the results table, so the detailed figures are

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not referenced in this review except for consistent p-values. Iswati et al. (2025)suggest studies with more complex designs such as randomized controlled trials to validate findings.

Nonetheless, these consistent findings have practical implications. Iswati et al. (2025) suggest that infant massage and *Baby Gym* included in maternal and child health services in primary health facilities with training for health workers, while Ate et al. (2026) emphasizing the promotion of exclusive breastfeeding along with routine developmental screening and parental education on age-appropriate stimulation.

CONCLUSION

Based on 20 articles reviewed, the motor development of infants aged 0-12 months was associated with several factors that could be grouped into nutrition, stimulation, and parenting conditions or patterns. Exclusive breastfeeding was significantly associated with body length growth or motor development in all five articles that discussed it, although the relationship to head circumference was not always significant. Baby massage, *baby gym*, and *baby spa* reported improved motor development in all nine intervention studies reviewed, with sessions lasting approximately 15-20 minutes for approximately one month, while direct comparisons between massage and *baby gym* showed no meaningful difference. A history of preterm birth, prolonged swinging, and lack of opportunities for free movement were associated with less age-appropriate motor development, while stimulation accompanied by physiotherapy facilitation was shown to accelerate improvement in delayed babies.

The strength of the evidence is still limited. Most intervention studies are small-scale, only four of the nine used the non-intervention group, and the results were measured with short-term screening instruments. Studies on exclusive breastfeeding and shading are cross-cutting or a review of cross-sectional studies, so they have not been able to demonstrate a causal relationship, and the ideal dose of stimulation has not yet been determined.

For health workers and parents, the results of this review support exclusive breastfeeding, the provision of free movement opportunities from an early age, as well as the implementation of baby massage or *baby gym* with correct techniques and good supervision. For the field of physical education and exercise, movement stimulation in infants can be a topic of study that links health and fundamental movement. Further research is recommended to use a randomized controlled design with a larger sample, compare stimulation doses directly, measure motor output with more detailed instruments, and follow up with infants in the longer term.

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