

Infant Physical Activity as A Strategy to Support Early Growth and Development: A Simple Observation Study

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ABSTRACT

Infants age 0-11 months are in a critical period of rapid growth and development known as the golden age. Proper stimulation, particularly physical activity, plays an important role in supporting optimal motor, sensory, and cognitive development. This study aims to describe the implementation of infant physical exercise as an early stimulation strategy to support growth and development outcomes. A descriptive observational method was conducted at two baby spa facilities. Data were collected through direct observation, documentation, and interviews with parents and midwives. The results showed that infants with prior exposure to physical exercise were more comfortable, calm, and cooperative, while those without prior experience tended to be fussy and less adaptive. In addition, the sequence of activities and infant readiness influenced the effectiveness of stimulation. Baby spa, including baby gym, gym ball exercises, and baby massage, was found to be an effective approach to support infant growth and development. In conclusion, physical stimulation should be introduced early, gradually, and adjusted to the infant's condition to achieve optimal developmental outcomes.

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1. INTRODUCTION

Infants aged 0-11 months are in the early stages of life, experiencing rapid growth and development. This period is known as the Golden Age because it is crucial in laying the foundation for physical, motor, sensory, and cognitive development in later life stages. Infant growth is characterized by increases in body size, while development includes improvements in gross motor, fine motor, language, and social skills. During this stage, stimulation plays an essential role in supporting optimal developmental progress. Therefore, infants require appropriate stimulation from an early age for optimal growth and development (Silaban et al., 2024)

According to the World Health Organization (WHO), approximately 52.9 million children under the age of five experience developmental disorders globally. In Indonesia, around 7.5% of children experience developmental delays in infancy, ranging from 5.3% to 7.5% of the total infant population (Susmita & Handayani, 2024). The WHO also recommends that infants under one year of age should be physically active several times a day. This includes at least 30 minutes of tummy time daily for infants who are not yet able to move independently. These data indicate that early physical stimulation is crucial for supporting optimal motor development, physical growth, and infant health (WHO, 2024).

One important form of stimulation for babies is physical exercise. Physical exercise for babies involves directed movement or physical activities designed to stimulate nervous system development and help strengthen muscles. It also helps improve balance, body coordination, and supports optimal gross motor development. Regular physical exercise helps infants in achieving developmental milestones, such as lifting their heads, rolling over, sitting, crawling, and standing. Therefore, consistent physical stimulation is essential to prevent delayed motor development during the golden period (Anggraini et al., 2022).

The implementation of physical exercise through a baby gym as part of a baby spa aligns with the Sustainable Development Goals (SDGs), particularly Goal 3, Good health, and Well-being, which focuses on improving the health and well-being of infants by stimulating optimal growth and development from an early age. Physical exercise plays a crucial role in supporting motor development, muscle strength, and body balance, as well as preventing developmental delays in infants aged 0–11 months. Additionally, this activity supports goal 4, Quality Education, by enhancing mothers' and parents' knowledge, understanding, and skills in providing stimulation appropriate to the infant's developmental stage. The education provided to parents helps improve their infant's growth and development independently and sustainably. Thus, the implementation of a baby gym not only contributes to the infant's physical health but also enhances the quality of family education in supporting the child's holistic development (United Nations, 2018).

One of the most widely used physical exercise methods today is baby spa. Baby spa is a holistic stimulation approach that combines physical exercise with relaxation. This method is designed to support an infant's overall development, including physical, sensory, and psychological aspects. Baby spa not only focuses on improving motor skills but also promotes comfort and emotional well-being. As a result, baby spa has become an effective method for supporting overall infant development (Andini & Susanti, 2024).

Baby spa treatments include several primary forms of stimulation: namely, baby gym on a mat, exercise using a gym ball, and baby massage. Baby gym is specifically designed to stimulate gross motor development, strengthen muscles and joints, and improve body coordination. Exercise with a gym ball helps train balance, body control, and muscle strength through more dynamic movements. Meanwhile, baby massage provides gentle touch stimulation that improves blood circulation, sleep quality, relaxation, and emotional bonding. The combination of these methods makes baby spa effective in supporting optimal growth and development in infants aged 0-11 months (Sari et al., 2023).

Although numerous studies have reported the benefits of baby gym, baby massage, and tummy time in enhancing infants' motor development, most previous research has primarily focused on intervention outcomes using quantitative approaches. The available evidence remains limited regarding how infants respond during physical activities in real-world settings, particularly when considering factors such as prior experience, activity sequence, and infant readiness. Therefore, this study aims to provide descriptive observational evidence regarding the implementation of infant physical activity across different practice settings. The novelty of this study lies in its comparison of infants with different prior experiences and readiness conditions during routine physical activity, highlighting practical factors that may influence infants' responses during stimulation.

2. METHOD

This study employed a descriptive observational design using a non-participant observation approach. The purpose of this study was to describe the implementation of infant physical activity sessions and infants' responses during routine practice without manipulating or influencing the activities performed. Therefore, no experimental intervention was conducted. The observations were conducted at two baby spa facilities that routinely provided infant physical activity programs, including baby gym, gym ball exercises, baby swimming, and baby massage. Although observations were conducted at two facilities, only two infants met the inclusion criteria and had complete observational data. Therefore, the analysis focused on these two infants as representative observational cases.

Two infants who met the inclusion criteria were recruited using convenience sampling. The inclusion criteria were: (1) infants aged 6-12 months, (2) healthy at the time of observation, (3) accompanied by a parent or legal guardian, and (4) parents or legal guardians who provided written informed consent. Infants with fever, acute illness, congenital conditions affecting motor function, respiratory distress, or persistent crying before the observation session were excluded.

Data were collected through direct observation, field notes, documentation, and semi-structured interviews with parents and healthcare providers. The observations focused on infants' prior exposure to physical activity, comfort level, behavioral responses, participation, activity sequence, and completion of each session. The data were analyzed descriptively by comparing the observational findings between the two infants to identify similarities and observed differences. No inferential statistical analysis was performed due to the small sample size. Participant confidentiality was maintained throughout the study, and written informed consent was obtained from all parents prior to data collection.

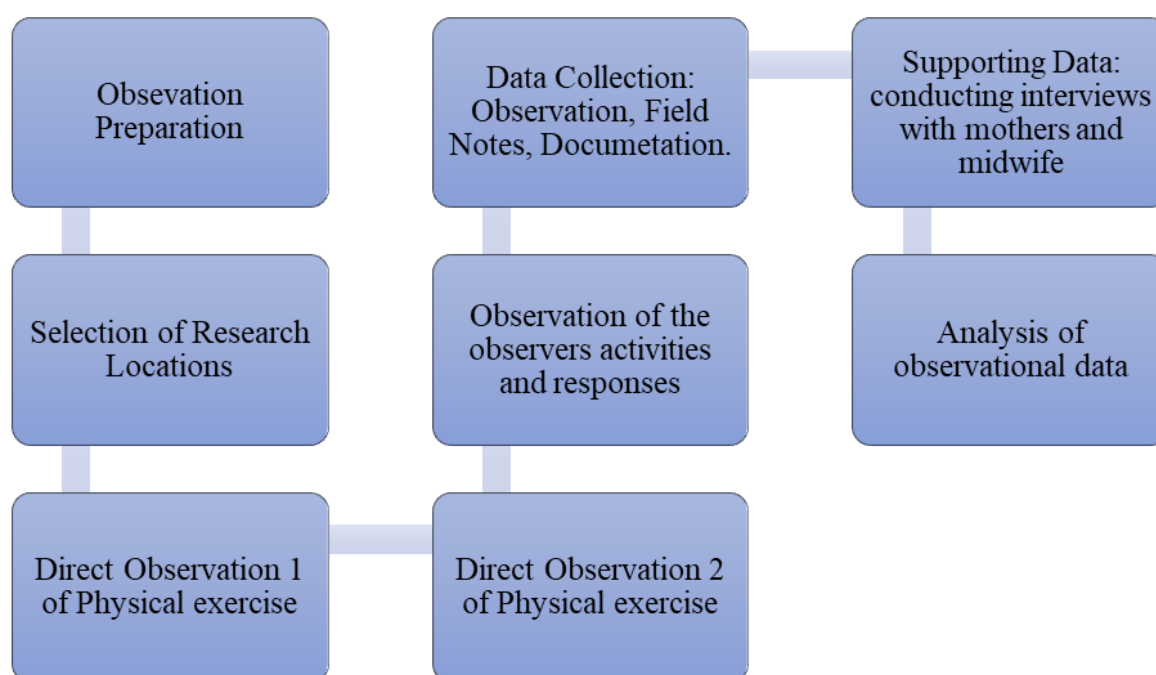


Figure 1. Flowchart of the observational procedures

3. RESULTS AND DISCUSSION

The observational findings are presented in Table 1. Table 1 summarizes the observational findings for the two infants. Baby A, who had previous experience with structured physical activity, appeared more comfortable, cooperative, and actively engaged throughout the session. In contrast, Baby D, who had no prior experience, demonstrated greater discomfort and limited participation during several activities. These observations suggest that previous exposure to physical activity and infant readiness may influence behavioral responses during routine physical activity sessions.

Based on observations conducted at two locations, the duration of each activity was consistent across both observation sites. Baby gym sessions lasted 10-15 minutes, baby swim sessions lasted 10-15 minutes, and baby massage sessions lasted 20-30 minutes. These durations align with recommended durations for infant physical activity and stimulation (Silaban et al., 2024) and global guidelines on infant physical activity (WHO, 2024). Both babies were also given toys to help them feel more comfortable and calmer during the activities. The difference between Baby A and Baby D lies in the sequence of activities performed and, in their reactions, which stem from their prior experience participating in physical activities. Baby A had previously participated in baby gym activities and was therefore more familiar with the environment and the movements involved. Baby A displayed expressions of joy, comfort, and cooperation throughout the activity. Baby D, on the other hand, was participating in the activity for the first time. These findings are consistent with previous research indicating that prior exposure and familiarity

with physical activity influence infants' behavioral responses, comfort, and participation during stimulation (Dinkel et al., 2023).

Table 1. Comparison of Observational Findings Between the Two Infants

Variable	Baby A	Baby D
Age	7 months	10 months
Gender	Boy	Girl
Previous exposure to physical activity	Had previous experience with baby gym	No previous experience with structured physical activity
Comfort	Comfortable, relaxed, and cooperative throughout the session	Initially uncomfortable and required additional support (e.g., toys)
Behavioral response	Calm, cheerful, and actively engaged	Fussy, cried, and resisted several activities
Ability to follow movements	Followed movement instructions well	Had difficulty following movement instructions
Completion of activities	Completed all planned activities	Some activities could not be completed due to discomfort
Activity sequence	Baby Gym → Baby Swimming → Baby Massage	Baby Massage → Baby Gym → Baby Swimming
Overall observation	Adapted well to the activities and environment	Required more time to adapt and showed lower participation

Supporting data from interviews with Baby D's mother revealed that the activity was conducted close to the baby's bedtime, causing fatigue and reduced responsiveness. This indicates that timing plays an important role in determining infant readiness during physical activity (Khurana & Inamdar, 2026). From a developmental perspective, physical activity should be introduced gradually, starting from early infancy, to support motor development and coordination. Early stimulation, such as a baby gym, has been proven to improve gross motor development in infants (Sari et al., 2023). In addition, complementary stimulation such as baby massage contributes to increased infant comfort and relaxation, which can enhance receptiveness to physical activity (Kozioł et al., 2023). However, it is also important to consider several contraindications when performing physical exercise in infants. Physical activity should be avoided when the infant is in an unfavorable condition, such as being overly tired, sleepy, after feeding, ill (e.g., fever), experiencing respiratory distress, or showing signs of discomfort and excessive crying. Performing stimulation under these conditions may lead to negative responses and reduce the effectiveness of the intervention (Zulhendri & Lita Nafratilova, 2025).

The observations suggest that Baby D's response may have been influenced by a lack of prior exposure to structured physical activity and the timing of the session, which coincided with the infant's usual sleeping time. In contrast, Baby A, who had previous experience with similar activities, appeared more comfortable and cooperative throughout the session. These observations indicate that infant readiness and previous exposure may influence behavioral responses during physical activity. However, because this study included only two infants, these findings should be interpreted cautiously and cannot be generalized to the broader infant population. Further studies involving larger samples are required to confirm these observations (WHO, 2024).

Based on current observations and supported by previous research, infant physical activity may be more effective when the infant is calm, alert, and well-rested. Conducting physical activity at least 30 minutes after feeding may also help reduce discomfort, regurgitation, or vomiting during the session (Silaban et al., 2024). Previous studies have further suggested that regular daily stimulation, such as tummy time, with low-to-moderate

intensity adjusted to the infant's developmental stage, may support optimal participation and development (Chen et al., 2024). Accordingly, physical activity should always be tailored to the infant's condition to maximize benefits and minimize potential discomfort or risk. In addition, caregivers should be aware of contraindications and consider the infant's readiness before performing physical activity.

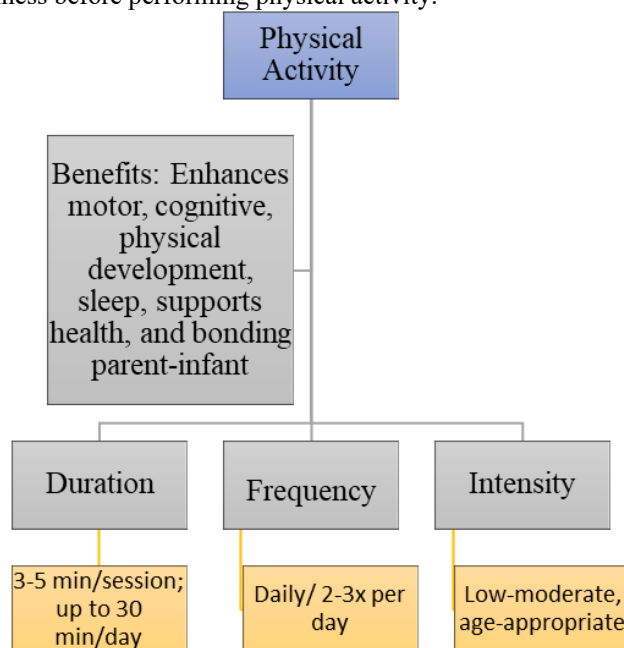


Figure 2. Flowchart of the Recommended Sequence of Infant Physical Activity

3.1. Benefits

Infant interventions, including physical activity, motor stimulation, and complementary therapies, offer substantial benefits for early growth and development. Regular engagement in activities such as tummy time and active play has been shown to enhance motor development, including muscle strength, coordination, and postural control. In addition, early movement experiences contribute to cognitive and sensory development by supporting brain maturation and environmental interaction (Sari et al., 2023). Physical activity in infancy also plays an important role in maintaining healthy body composition and preventing obesity later in life (Eichner-Seitz et al., 2023). Furthermore, these interventions support cardiovascular and metabolic health, as well as bone and muscle development (WHO, 2024).

Complementary approaches, particularly infant massage, have demonstrated positive effects on digestive function by improving bowel movements and reducing constipation (Akdogan & Yildiz, 2025; Liu et al., 2021). They are also associated with lower in colic symptoms, including decreased crying duration and improved infant comfort. Moreover, both physical activity and touch-based interventions contribute to better sleep quality and emotional regulation. Importantly, such practices strengthen parent-infant bonding through increased physical and emotional interaction. Overall, early-life interventions not only support immediate developmental outcomes but also promote long-term health and well-being (United Nations, 2018). Although these benefits have been reported in previous studies, the present study was limited to observational findings from two infants and was not designed to evaluate the effectiveness of these interventions.

3.2. Duration, Frequency, and Intensity

Tummy time is recommended daily, starting with short sessions of 3-5 minutes, 2-3 times per day, and gradually increasing to at least 30 minutes per day as tolerated. Infant gymnastics exercises play a crucial role in supporting a baby's motor development. Proper movements typically involve prone (stomach) and supine (back) positions, which facilitate muscle activation, coordination, and postural control. The recommended duration for

each infant gymnastics' session is approximately 10-15 minutes, providing adequate stimulation while minimizing the risk of fatigue. These exercises may be performed approximately twice a week to provide consistent motor stimulation. In addition, previous studies have reported that infant massage may be provided once a week for four consecutive weeks, with each session lasting approximately 30 minutes (Silaban et al., 2024).

This program can begin with baby gym exercises, which last about 10-15 minutes per session, starting on a mat so that the baby can perform basic movements such as lying on their stomach and back, with modifications to some movements. Next, a gym ball is used to further stimulate balance, coordination, and postural control through guided movements. The session can then conclude with a baby massage, which serves as a form of relaxation and stretching following physical activity. Massage helps reduce muscle tension, improve circulation, and enhance the baby's overall comfort.

4. CONCLUSION

Based on observations of two infants during routine physical activity sessions, differences in behavioral responses were identified. The infant with prior experience in structured physical activity appeared more comfortable, cooperative, and able to complete the activity sequence, whereas the infant without previous experience showed greater discomfort and limited participation during several activities. The observations also suggest that factors such as previous exposure, infant readiness, comfort level, and the timing and sequence of activities may be associated with differences in infants' responses during physical activity sessions.

Because this study involved only two observational cases, these findings should be interpreted with caution and cannot be generalized to the broader infant population. The present study provides preliminary observational insights into factors associated with infants' responses during routine physical activity sessions. Further studies involving larger samples and more rigorous study designs are needed to confirm these observations and explore additional factors associated with infant physical activity.

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LIMITATIONS

This study has limitations, including a small sample size, with only two infants, and the exclusion of infants under four months of age, particularly those unable to lift their heads, thereby limiting the generalizability of these findings.

REFERENCES

- Akdogan, R., & Yildiz, S. (2025). The effect of SPA and massage applied on babies on colic symptoms: A randomized controlled trial. *Journal of Pediatric Nursing*, 82, e164–e174. <https://doi.org/10.1016/j.pedn.2025.04.008>
- Andini, I. F., & Susanti, E. (2024). Baby Spa dan Baby Massage Terhadap Berat Badan Bayi Usia 3-6 Bulan di Praktek Mandiri Bidan Kabupaten Rejang Lebong. *JIK JURNAL ILMU KESEHATAN*, 8(1), 87. <https://doi.org/10.33757/jik.v8i1.929>
- Anggraini, R., Fatrin, T., Selatan, S., Kunci, K., Motorik, P., & Bayi, S. (2022). PENERAPAN SENAM BAYI UNTUK MENINGKATKAN PERKEMBANGAN MOTORIK BAYI 3-12 BULAN APPLICATION OF BABY GYMNASTICS TO IMPROVE MOTOR DEVELOPMENT OF BABIES 3-12 MONTHS. *Cendekia Medika : Jurnal STIKES Al-Ma'arif Baturaja*, 7(1).
- Chen, S. C., Lin, S. L., Wang, M., Cheung, D. S. T., Liang, J. G., Cheng, Z. Y., Yuen, C. S., & Yeung, W. F. (2024). Pediatric massage therapy in infants and children under 5 years: An umbrella review of systematic reviews. *Heliyon*, 10(16). <https://doi.org/10.1016/j.heliyon.2024.e35993>



- Dinkel, D., Snyder, K., Chaudhary, P., & DeVeney, S. (2023). A qualitative comparison case study exploring perceptions of infants' physical activity, and communication by parents, childcare providers, and healthcare providers. *Global Pediatrics*, 3. <https://doi.org/10.1016/j.gped.2023.100039>
- Eichner-Seitz, N., Pate, R. R., & Paul, I. M. (2023). Physical activity in infancy and early childhood: a narrative review of interventions for prevention of obesity and associated health outcomes. In *Frontiers in Endocrinology* (Vol. 14). Frontiers Media S.A. <https://doi.org/10.3389/fendo.2023.1155925>
- Khurana, S., & Inamdar, K. (2026). Multidisciplinary interventions to promote tummy time practice and developmental outcomes in infants: A scoping review. In *Infant Behavior and Development* (Vol. 83). Elsevier Ltd. <https://doi.org/10.1016/j.infbeh.2026.102193>
- Kozioł, A., López Pérez, D., Laudańska, Z., Malinowska-Korczak, A., Babis, K., Mykhailova, O., D'Souza, H., & Tomalski, P. (2023). Motor Overflow during Reaching in Infancy: Quantification of Limb Movement Using Inertial Motion Units. *Sensors*, 23(5). <https://doi.org/10.3390/s23052653>
- Liu, Z., Gang, L., Yunwei, M., & Lin, L. (2021). Clinical Efficacy of Infantile Massage in the Treatment of Infant Functional Constipation: A Meta-Analysis. *Frontiers in Public Health*, 9, 663581. <https://doi.org/10.3389/fpubh.2021.663581>
- Sari, N., Ulya, F. H., & Agustina, P. (2023). Pengaruh Baby Gym Pada Perkembangan Motorik Kasar Bayi Usia 3-4 Bulan. *Jurnal Kebidanan Malakbi*, 4(1), 74. <https://doi.org/10.33490/b.v4i1.675>
- Silaban, V. F., Harefa, R. E., Sinaga, R. F. B., & Simamora, R. S. S. B. (2024). Pengaruh Tummy Time Exercise Terhadap Perkembangan Motorik Kasar dan Durasi Lama Mengangkat Kepala Pada Bayi Usia 0-6 Bulan di Klinik Pratama Ika Medan. *Malahayati Nursing Journal*, 6(6), 2188–2199. <https://doi.org/10.33024/mnj.v6i6.14846>
- United Nations. (2018). *Transforming our world _ the 2030 Agenda for Sustainable Development*.
- WHO. (2024, June 26). *Physical activity*.
- Zulhendri, A. F. N., & Lita Nafratillova. (2025). Pijat I Love You (ILU) Solusi Asuhan Kebidanan dalam Mengatasi Bayi Kembung. *Vitamin : Jurnal Ilmu Kesehatan Umum*, 3(2), 266–283. <https://doi.org/10.61132/vitamin.v3i2.1655>