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THE IMPLEMENTATION OF INFANT MASSAGE ON THE SLEEP QUALITY OF INFANTS AGED 0-12 MONTHS IN THE WORKING AREA OF THE NGORESAN PUBLIC HEALTH CENTER

PENERAPAN PIJAT BAYI TERHADAP KUALITAS TIDUR BAYI USIA 0-12 BULAN DI WILAYAH KERJA PUSKESMAS NGORESAN

Hyasintha Aryanti[1*], Siti Fatimah[2], Yohana Ika Prastiwi[3]

[1*,2,3]Universitas 'Aisyiyah Surakarta, Email : hyasinthaa@gmail.com

*email koresponden: hyasinthaa@gmail.com

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Abstract

This study aims to analyze the effect of Financial Target, Financial Stability, and External Pressure on Financial Statement Fraud, with Market Capitalization as a moderating variable, in manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the period 2017–2019. The research employs a quantitative approach using panel data regression analysis with the Common Effect Model (CEM) and the Moderated Regression Analysis (MRA) technique. The data were obtained from the financial statements of manufacturing companies that met the sampling criteria over a three-year observation period. The results indicate that Financial Target (ROA) has a positive and significant effect on financial statement fraud. Financial Stability (INVSAL and CATA) also shows a significant effect but in different directions: INVSAL increases, while CATA decreases the likelihood of fraudulent financial reporting. External Pressure (FREEC) has a negative and significant effect on financial statement fraud. The moderating variable, Market Capitalization, was found to strengthen the effect of CATA and weaken the effect of INVSAL on financial statement fraud. The R^2 value of 17.52% indicates that the research model explains a moderate portion of the variation in financial statement fraud among manufacturing firms in Indonesia. These findings support Agency Theory and the Fraud Triangle Theory, suggesting that financial pressure, stability, and external conditions play a crucial role in influencing the occurrence of financial statement fraud.

Keywords : Financial Target, Financial Stability, External Pressure, Market Capitalization, Financial Statement Fraud.

Abstrak

Latar Belakang: Kualitas tidur merupakan faktor penting yang mendukung pertumbuhan dan perkembangan bayi usia 0–12 bulan. Tingginya prevalensi gangguan tidur, jika tidak ditangani secara

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serius, dapat memicu gangguan fungsi organ tubuh dan menghambat maturasi sistem saraf pusat. Salah satu intervensi *nonfarmakologis* yang aman untuk mengatasi masalah ini adalah stimulasi pijat bayi. Tujuan: Mengetahui efektivitas penerapan pijat bayi terhadap kualitas tidur bayi usia 0–12 bulan di wilayah kerja Puskesmas Ngoresan. Metode: Penelitian ini menggunakan desain studi kasus deskriptif pada dua bayi usia 0–12 bulan yang mengalami gangguan kualitas tidur. Intervensi pijat bayi dilakukan secara mandiri oleh ibu dengan durasi 10–15 menit, sebanyak 1 kali sehari selama 14 hari berturut-turut. Pengumpulan data kualitas tidur dilakukan melalui wawancara menggunakan kuesioner *Brief Infant Sleep Questionnaire* (BISQ) sebagai instrumen *pre-test* dan *post-test*. Hasil: Sebelum intervensi, kedua responden memiliki skor BISQ 5 dengan kategori masalah berat. Setelah diberikan intervensi pijat bayi secara rutin, skor BISQ meningkat menjadi 11 dan 12 yang menunjukkan kualitas tidur membaik dan tidak terdapat masalah tidur. Kesimpulan: Penerapan terkait dengan pijat bayi secara rutin dapat menurunkan frekuensi terbangun di malam hari serta mengatasi durasi tidur yang singkat pada bayi, sehingga efektif meningkatkan kualitas tidur dan dapat direkomendasikan sebagai terapi komplementer yang mudah diterapkan oleh orang tua di rumah.

Kata Kunci : Pijat Bayi, Kualitas Tidur, Bayi, *Brief Infant Sleep Questionnaire* (BISQ), *Nonfarmakologis*.

1. INTRODUCTION

Infancy is a crucial phase of growth and development due to the rapid maturation of various organ systems and neurological functions. During this period, appropriate parental stimulation is essential to support the optimal achievement of the baby's growth and development potential. Neglecting aspects of growth and development can increase the risk of disorders with long-term impacts (Fuji et al., 2024). One important aspect of infant growth and development is sleep quality. Sleep plays a role in physical growth, nervous system maturation, information and memory consolidation, and emotional stability. Growth hormone secreted during sleep plays a role in cell regeneration, bone growth, and muscle mass development. Conversely, sleep deprivation can cause babies to become fussy and irritable, and potentially disrupt cognitive function and development (Rahayu et al., 2022; Pamungkas, 2026; Irianti & Karlinah, 2021).

Sleep disorders are a common problem in infants and can be influenced by various factors. Central nervous system maturity plays a role in establishing circadian rhythms, while hunger, digestive disorders, teething, and an infant's inability to self-soothe can cause frequent nighttime awakenings (Fitriyanti & Atik, 2024). In addition to internal factors, the sleep environment, such as noise, bright lighting, room temperature, and excessive stimulation before bedtime, can also prevent babies from achieving deeper sleep (Mutiara et al., 2024). Therefore, efforts are needed to create a comfortable sleep environment and establish a consistent sleep routine. One non-pharmacological intervention that can be implemented is infant massage (Jihan et al., 2023).

Infant massage is a systematic tactile stimulation using gentle pressure and movement on the baby's body. Infant massage not only provides a relaxing effect but can also help improve blood circulation and the lymphatic system and strengthen the emotional bond between parent and baby (Febri & Triana, 2023; Pratiwi, 2021). The use of infant massage to improve sleep quality is related to stimulation of the parasympathetic nervous system, including the vagus nerve, which can help reduce stress responses and promote relaxation. This condition supports the regulation of hormones related to sleep, making it easier for babies to achieve restful and deep sleep (Mallorong et al., 2026). In addition to its potential to improve sleep quality, infant massage has the advantage of being non-pharmacological, relatively easy to perform, inexpensive, and accessible to parents. Infant massage has also been reported to benefit appetite, digestive function, physical comfort, and interaction and bonding between parents and infants (Mutiara et al., 2024).

The issue of sleep quality in infants requires attention because suboptimal sleep can impact growth and development. Efforts to improve infant sleep quality can be achieved not only through

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environmental adjustments and sleep routines, but also through complementary interventions that parents can perform independently. Infant massage is one viable alternative because it is simple, does not involve medication, and allows for direct parental involvement in infant care.

Based on this phenomenon, the application of infant massage as an intervention to improve sleep quality needs further study, especially in infants aged 0–12 months. This study was conducted in the working area of the Ngoresan Community Health Center to determine the results of the independent application of infant massage by mothers in addressing infant sleep quality problems. This study aimed to identify infant sleep quality before and after the application of infant massage, analyze the development of sleep quality during the application of infant massage on days 1 to 5, and assess the application of infant massage as a non-pharmacological method in addressing sleep disorders in infants aged 0–12 months.

2. RESEARCH METHOD

This study used a case study method with a nursing care approach to describe the application of infant massage on the sleep quality of infants aged 0–12 months. The intervention was carried out independently by mothers at home for 10–15 minutes, once daily before bedtime, for 14 consecutive days. The case study was conducted to observe and evaluate changes in infant sleep quality before and after the implementation of infant massage in the Ngoresan Community Health Center (Puskesmas) work area.

The study subjects consisted of two infants aged 0–12 months who were experiencing sleep quality issues. Subject selection was based on inclusion and exclusion criteria (Sugiyono, 2021). Inclusion criteria included infants aged 0–12 months who were healthy and free from congenital abnormalities or serious illnesses, had never received regular massage, and had parents or guardians willing to accompany the study process for 14 days and sign an informed consent form. Exclusion criteria included infants undergoing intensive care or experiencing acute illness during the intervention period. The two subjects used were Respondent 1, aged 10 months, and Respondent 2, aged 6 months. Both experienced suboptimal sleep quality, with complaints of frequent nighttime awakenings, suboptimal sleep duration, and fussy behavior. The intervention provided to both respondents consisted of independent infant massage by the mother, with the same duration and frequency.

Infant massage was performed according to Standard Operating Procedures (SOP), involving gentle touch stimulation of the feet, stomach, chest, hands, face, and back for 10–15 minutes before bedtime. Mothers' compliance and accuracy in performing the massage techniques were observed based on the SOP. The independent variable in this study was infant massage, while the dependent variable was infant sleep quality. Sleep quality was measured using the *Brief Infant Sleep Questionnaire* (BISQ), with parameters including sleep duration, frequency of nighttime awakenings, and fussy behavior. The measurement results were categorized as follows: a score of 11–15 indicates no sleep problems, a score of 6–10 indicates mild sleep problems, and a score of 1–5 indicates severe sleep problems. Data were obtained through structured interviews with mothers before and after the intervention.

The study was conducted in the Ngoresan Community Health Center (Puskesmas) working area from May 5–19, 2026. On May 5, 2026, a pre-test was conducted using the BISQ and mothers were educated on infant massage techniques according to standard operating procedures (SOP). Subsequently, from May 6–19, 2026, mothers performed infant massage independently at home once daily for 14 days under regular supervision by the researcher. On May 19, 2026, a post-test was conducted to evaluate changes in infant sleep quality.

Data collection was conducted through observation, interviews, and documentation. Observations were used to assess maternal compliance with massage techniques according to standard operating procedures. Interviews were conducted using the BISQ at the pre-test and post-test stages to obtain data on infant sleep quality. Documentation, in the form of questionnaires and documentation of the intervention implementation, was conducted while maintaining respondent privacy. The

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collected data were then reduced and presented in comparative tables and narratives to illustrate changes in sleep quality before and after the intervention. The analysis was conducted by comparing the pre-test and post-test results for each respondent.

The study was conducted after obtaining permission from the Faculty of Health Sciences, 'Aisyiyah University, Surakarta, and approval from the Ngoresan Community Health Center. Ethical aspects of the study included informed consent, anonymity, confidentiality, veracity, and justice. Parents were provided with an explanation of the purpose, procedure, duration, benefits, and potential discomfort during infant massage before providing consent. Respondents' identities were kept confidential using a code, all data was used solely for scientific purposes, and each respondent received the same massage procedure according to standard operating procedures (SOPs) regardless of social background.

3. RESULT AND DISCUSSION

1. Implementation Results

a. *The level of quality of the baby's sleep before the application of baby massage*

Table 1 Level of baby sleep quality before applying baby massage

No	Name	Score	Information
1	Respondent 1	5	Serious problem
3	Respondent 2	5	Serious problem

Source: Primary data 2026

Based on table 1, the sleep quality scores of the two respondents before the application of baby massage to respondent 1 were 5 (serious problem), while respondent 2 also got a score of 5 (serious problem).

b. The level of quality of baby's sleep after applying baby massage

Table 2 Level of baby sleep quality after applying baby massage

No	Nama	Skor	Keterangan
1	Respondent 1	11	No problem
2	Respondent 2	12	No problem

Source: Primary data 2026

Based on table 2, the sleep quality score after applying baby massage to respondent 1 was 11 (no problems), while respondent 2 was 12 (no problems).

c. Development of baby's sleep quality before and after baby massage

Table 3 Development of baby's sleep quality before and after applying baby massage

The day	Respondent 1		Responden 2	
	Before	After	Before	After
1	5 (Serious problem)	6 (Minor problems)	5 (Serious problem)	6 (Minor problems)
2	7 (Minor problems)	8 (Minor problems)	7 (Minor problems)	8 (Minor problems)
3	8 (Minor problems)	9 (Minor problems)	8 (Minor problems)	9 (Minor problems)
4	9 (Minor problems)	10 (No Problem)	9 (Minor problems)	10 (No Problem)
5	10(No Problem)	11 (No Problem)	10 (No Problem)	12 (No Problem)

Source: Primary data 2026

Based on Table 3, Respondent 1's sleep quality score increased from 5 (severe problems) to 11 (no problems). Significant improvement occurred on day 5, with a score of 10 before implementation, rising to 11 after implementation.

Respondent 2's sleep quality score increased from 5 (severe problems) to 11 (no problems). A significant improvement occurred on day 5, with a score of 10 before implementation, rising to 12 after implementation.

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d. *Comparison of the final results of applying baby massage between 2 baby respondents*

Table 4 Comparison of the final results of the application of baby massage between 2 baby respondents

Respondent	Before	After	Difference
R1	5 (Serious problem)	11 (No Problem)	6 point
R2	5(Serious problem)	12 (No Problem)	7 point

Source: Primary data 2026

Based on table 4, the sleep quality score for respondent 1 before the application of infant massage was 5 (severe problem), and after the application of infant massage, it decreased by 6 points to a score of 11 (no problem). Meanwhile, for respondent 2, before the application of infant massage, the score was 5 (severe problem), and after the application of infant massage, it decreased by 7 points to a score of 12 (no problem). Both experienced a decrease in the level of sleep quality problems from severe problems to no problems. These results indicate that providing infant massage to infants aged 0-12 months is effective and has an influence on reducing infant sleep quality problems.

DICUSSION

Based on the results of the infant massage application presented, further discussion was conducted to interpret the data from the application, which will then be linked to related theories:

a. Infant sleep quality before infant massage application

Based on the measurements conducted on both respondents, the sleep quality score before infant massage application for respondent 1 was 5, categorized as a severe problem. Meanwhile, respondent 2's sleep quality score was 5, categorized as a severe problem. Both infants' Brief Infant Sleep Questionnaire (BISQ) scores were categorized as a severe problem.

This aligns with the theory that the Brief Infant Sleep Questionnaire (BISQ) consists of five closed-ended questions. Questions 1-5 each receive a score of 1, 2, and 3. The total score for the five questions is calculated as a severe problem, a 6-10 indicates a mild problem, and a 11-15 indicates no sleep problems (Sumarni & Injiyahi, 2024).

The causes of suboptimal sleep quality in babies are diverse, ranging from internal biological factors to specific physical conditions. The maturity of the central nervous system plays a crucial role in establishing a baby's circadian rhythm, or biological clock. Babies often experience physical discomfort due to digestive problems, hunger, or teething. A baby's inability to self-soothe is also a major cause of frequent nighttime awakenings (Fitriyanti and Atik, 2024).

Environmental factors such as noise, bright lights, and room temperature significantly influence the depth of a baby's sleep. Excessive stimulation just before bedtime can keep a baby's nervous system awake even though their body is already tired. Parents need to be aware that an unconducive environment will disrupt a baby's transition to deeper sleep. Creating a calm and comfortable bedroom environment is a crucial first step in improving a baby's sleep quality (Mutiara et al., 2024). A baby's inability to self-soothe is a major cause of frequent nighttime awakenings (Fitriyanti and Atik, 2024).

b. Infant Sleep Quality After Infant Massage

Based on the sleep quality score after infant massage, respondent 1 scored 11 (no problems), while respondent 2 also scored 12 (no problems). This decrease in scores is due to the mechanism of infant massage working through nerve stimulation. This stimulation lowers cortisol levels, resulting in a more relaxed baby and a relief from physiological stress. This decrease in stress hormones is accompanied by an increase in serotonin production, which is then converted into melatonin, the sleep hormone. This process allows babies to enter deeper sleep and improves sleep quality.

The results of this study align with the theory of Sumarni & Injiyahi (2024), who stated that massage stimulates the release of the hormone oxytocin from the hypothalamus. The hypothalamus instructs the pituitary gland to release oxytocin, resulting in a comfortable, calming baby, and improving sleep quality.

These results also align with research by Ningsih et al. (2022) that found that of 21 respondents who had undergone infant massage, 17 experienced good sleep quality, and 4 experienced restless

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sleep. The p-value test result was 0.05, indicating a relationship between infant massage and sleep quality in infants aged 0-12 months. Infant massage can improve sleep quality and quantity. Systematic massage has a profoundly relaxing effect on the baby's muscular and peripheral nervous systems. Through gentle tactile stimulation, the baby's body responds by reducing muscle tension caused by daily activities. This significantly reduces irritability and helps the baby enter deep sleep more quickly. Maintaining quality sleep ensures that the baby wakes up less frequently during the night, allowing the brain's energy recovery and memory consolidation processes to proceed smoothly (Pratiwi, 2021).

a. Changes in infant sleep quality before and after the implementation of infant massage.

After infant massage, there was an improvement in sleep quality in respondent 1, who previously experienced sleep problems, with a score of 5 (severe problems) increasing to 11 (no problems). Respondent 2, who previously experienced sleep problems, also increased to 12 (no problems) with sleep quality.

This also aligns with research conducted by Handayani & Maryatun (2024), which found that after applying infant massage three times a week for two weeks with a massage duration of 15 minutes, there was an improvement in sleep quality in By.S., who previously experienced mild sleep problems, with a Brief Infant Sleep Questionnaire (BISQ) score of 7 increasing to 15, indicating good sleep quality. And By.A., who previously experienced mild sleep problems, with a Brief Infant Sleep Questionnaire (BISQ) score increasing to 13, indicating good sleep quality.

Infant massage is a form of tactile stimulation performed in a planned and systematic manner on the entire baby's body. This practice involves manipulating soft tissue with specific pressure techniques and movements to improve the baby's physical well-being. As a tradition now supported by science, infant massage provides a highly effective bridge of non-verbal communication. The loving touch of massage provides a sense of security while supporting sensory nerve development during a baby's golden period of development (Febri and Triana, 2023).

b. Comparison of the final results of the application of baby massage between 2 baby respondents.

Based on the results of the presentation, it can be described that after applying infant massage, there was an improvement in sleep quality in respondent 1, with a score of 6 points, from 5 to 11. Meanwhile, respondent 2 experienced a 7-point increase, from 5 to 12. The difference in results may be due to respondent 2 being more active and attractive, making them more likely to experience fatigue compared to respondent 1, who engaged in less physical activity.

One factor that influences infant sleep quality is physical activity, such as moving the arms and legs, and rolling from a supine position to a prone position or vice versa. This contributes to poor sleep quality in infants, particularly fatigue due to the physical activity the baby engages in over a 24-hour period (Sumarni & Injiyahi, 2024). Stimulation factors and daytime activities also affect sleep quality. Overstimulation before bedtime, such as excessive physical play or screen time, can cause the central nervous system to remain in an excited (alert) state, thus hindering the transition to sleep (Irianti & Karlinah, 2021).

The significant change in sleep quality scores before and after infant massage treatment indicates that infant massage can be used as a non-pharmacological therapy solution and has been proven effective in reducing sleep quality problems in infants aged 0-12 months.

c. Research Limitations

Overall, the implementation of this study did not encounter significant obstacles. However, the report on this study is far from perfect. Limitations include:

1. The infant massage study was conducted with a limited number of respondents, which may affect the validity of the results.
2. The baby cried during the initial massage, so the researcher approached the baby first to ensure he or she remained calm and relaxed during the massage.

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4. CONCLUSION

1. The sleep quality of infants before and after the application of infant massage for respondents 1 and 2 was categorized as severe.
2. The sleep quality of infants after the application of infant massage for respondents 1 and 2 was categorized as no problems.
3. The development of infant sleep quality during the application of infant massage from days 1 to 5 showed an increase in scores ranging from severe problems, mild problems, to no problems. Before the application, respondent 1's sleep quality score was 5, but after the application, it increased to 11. Respondent 2's initial score was 5, but after the application, it increased to 12. It can be concluded that the application of infant massage has an effect on improving the sleep quality of infants aged 0-12 months.
4. Comparing the final results of the application of infant massage for both respondents, respondent 1 experienced a decrease from severe problems to no problems, and respondent 2 also experienced a decrease from severe problems to no problems. Infant massage is effective as a non-pharmacological therapy method for addressing sleep disorders in infants aged 0-12 months.

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