



EFFECTIVENESS OF CHILDREN'S MUSIC THERAPY ON CHANGES IN HOSPITALIZED CHILDREN'S ANXIETY LEVELS: QUASI EXPERIMENTAL STUDY

Finna Rachma Agustin, Irdawati*

Nursing Profession, Faculty of Health Science, Universitas Muhammadiyah Surakarta, Jl. Ahmad Yani, Pabelan, Kartasura, Sukoharjo, Central Java 57169, Indonesia

*irdawati@ums.ac.id

ABSTRACT

Hospitalization can cause anxiety in children due to unfamiliar environments, the sound of medical devices, and frightening procedures. This condition causes children to feel scared, cry, have trouble sleeping, and refuse medical treatment, thus hindering the healing process. One of the nonpharmacological interventions that can be used to reduce anxiety is music therapy, because music has a relaxing, calming, and fun effect on children. This study aimed to analyze the effectiveness of children's music therapy on changes in anxiety levels during hospitalization. The research design used a quasi-experimental approach with a one group pretest-posttest approach on 10 children treated in the children's room of Indriati Hospital. The sampling technique used was purposive sampling. The intervention was given for three days with two sessions per day using selected children's music such as Cocomelon, Cicak-cicak di dinding, and Baby Shark. Anxiety levels were measured using the Facial Image Scale (FIS) and analyzed using the Wilcoxon test. The Wilcoxon test showed values of ($Z = -6.797$; $p < 0.001$), which means that there was a significant difference between anxiety levels before and after music therapy. The average anxiety score decreased from 4.53 (severe anxiety) to 2.17 (not anxious). Children's music therapy is effective in reducing anxiety levels during hospitalization and can be used as a nonpharmacological intervention in pediatric nursing care.

Keywords: anxiety; children; hospitalization; music therapy

How to Cite (in APA Style)

Agustin, F. R., & Irdawati, I. (2026). Effectiveness of Children's Music Therapy on Changes in Hospitalized Children's Anxiety Levels: Quasi Experimental Study. *Indonesian Journal of Global Health Research*, 8(2), 843–850. <https://doi.org/10.37287/ijghr.v8i2.771>.

INTRODUCTION

Hospitalization is an important stressful experience for children because it separates them from familiar environments and caregivers and exposes them to frightening medical procedures (Wijaya & Wulaningsih, 2025). Common emotional reactions that arise include anxiety, fear, crying, and sleep disturbances that can interfere with the recovery process and medication adherence. Globally, a systematic review by Racine et al. (2021) reported that the prevalence of anxiety disorders in children and adolescents reached 20.5% and increased sharply during the COVID-19 pandemic. These findings reveal that anxiety is a common mental health disorder experienced by children, especially when they face stressful conditions such as hospitalization.

Additional studies conducted by Ali et al. (2024) revealed that children who undergo hospital instays are at greater risk of developing mental health problems, such as anxiety compared to children who are not hospitalized. The retrospective study showed an increase in new diagnoses of anxiety disorders after treatment in children's hospitals in the United States. At the national level, a recent research report in Indonesia indicates that more than 60% of treated children experience moderate to severe anxiety during hospitalization (Andiny et al., 2023; Rahmadani et al., 2023). Causative factors include separation from parents, fear of medical procedures, and an unfamiliar hospital environment.

Some studies reveal that music therapy serves as a non-pharmacological approach that successfully reduces anxiety levels in children. Bar et al. (2023) in a systematic review of 15 randomized

controlled trial studies found that music therapy was able to reduce children's pain and anxiety during medical procedures, especially when children were allowed to choose their preferred type of music. A similar finding was found by Hakim et al. (2023) who reported that non-verbal music played for 20 minutes per day for three days significantly lowered anxiety levels ($p = 0.000$).

In addition to serving as a distraction, music therapy also affects the body's limbic system and autonomic response through the activation of dopaminergic pathways, which results in physiological relaxation effects such as decreased breathing frequency and heart rate (Koenig et al., 2022). Research conducted by Zengin et al. (2023) showed that children who listened to music before the invasive procedure experienced a 40% reduction in anxiety scores compared to the control group. These findings reinforce the understanding that music has a noticeable therapeutic effect on children's emotional regulation.

Another study by Ullah et al. (2022) showed that music therapy given to school-age children during hospitalization not only lowers anxiety, but also improves positive emotional expression and interactions with healthcare workers. In the context of child nursing, music that children are familiar with—for example, popular children's songs such as *Cicak-cicak di dinding* or *Baby Shark*—is able to evoke a sense of security because it reminds them of the home environment.

Furthermore, a meta-analysis by Wang et al. (2024) reported that the effect of music therapy on children's anxiety showed moderate to high effect sizes ($SMD = -0.48$; $CI\ 95\%: -0.81$ to -0.15), especially when children are given the opportunity to choose their own music (child-preferred music). Similar findings were also expressed by Liu et al. (2022), who emphasized the importance of adjusting the duration and type of music to the child's age and cultural preferences to achieve optimal outcomes.

In Indonesia, the results of a literature review by Putri & Dewi (2024) show that music therapy is one of the most effective nursing interventions to reduce children's anxiety in children's inpatient rooms, but its application is still limited and has not been standardized in pediatric nursing clinic practice guidelines. Therefore, more research is needed to strengthen the empirical evidence and encourage the implementation of music therapy as a routine intervention in hospitals. Based on this background, the purpose of this study was to analyze the effectiveness of children's music therapy on changes in anxiety levels among hospitalized children.

METHOD

This study uses a quasi-experimental design with a one group pretest–posttest design approach. This design was chosen because it was able to depict changes in children's anxiety levels before and after being given music therapy without the need for a control group as a comparison. This approach is prevalent in pediatric nursing research because it considers the ethical and psychological aspects of early childhood participants, where the process of randomization or the division of control groups is not always morally feasible (Snyder & Mendoza, 2023). In addition, this design provides an opportunity for researchers to observe the direct effects of a therapeutic intervention on a child's emotional state in the context of complex hospitalization (Creswell & Guetterman, 2024).

The research was carried out in September 2025 in the Pediatric Intensive Care Room of Indriati Hospital. The study location was chosen purposively based on the results of preliminary observations that showed that most of the hospitalized children experienced signs of moderate to severe anxiety during the hospitalization process. The paediatric wards were chosen because they provide a relatively calm and controlled environment, and allow for the implementation of music therapy without disrupting the schedule of routine medical procedures. In addition, the hospital also provides positive support for research oriented towards the development of nonpharmacological interventions for children.

The study population included all children who underwent hospitalization in the inpatient ward of Indriati Hospital during the study period. Sample selection uses purposive sampling technique, which is the deliberate selection of subjects based on certain criteria according to the research objectives. The inclusion criteria include children aged 3-10 years, undergoing hospitalization for at least three days, being in a conscious condition and able to interact, and having a parent or guardian who is willing to sign an informed consent. Children with hearing loss, severe developmental delays, or critical medical conditions were excluded from the study. Based on these criteria, 10 eligible children were obtained. Although this number is relatively small, it meets the minimum requirements of nonparametric analysis with the Wilcoxon Signed Rank test, which is suitable for abnormally distributed data and small samples (Field, 2022).

The independent variable in this study was children's music therapy, while the dependent variable was the child's anxiety level. Anxiety measurement was carried out using the Facial Image Scale (FIS), which is a simple measuring tool consisting of five images of facial expressions ranging from very happy (score 1) to very unhappy (score 5). This instrument has been widely validated in the measurement of anxiety in preschool to elementary school age and has proven to be easy to understand (Rahmadani et al., 2023). FIS has high reliability with Cronbach's alpha value of 0.84, indicating good internal consistency in describing the child's emotional state.

The research process begins with a pretest, which is a measurement of children's anxiety levels using FIS before being given therapy. Measurements are carried out in a comfortable atmosphere and without additional pressure. Afterwards, the researchers gave the children three consecutive days of music therapy with two sessions per day, each lasting about 20 minutes. Music is played through portable speakers with a maximum volume of 60 dB to be safe for children's hearing. The type of music used includes cheerful and familiar children's songs, such as *Cicak-cicak di dinding*, *Naik-naik ke puncak gunung*, *Potong bebek angsa*, *Baby Shark*, and *Cocomelon*. The selection of songs is adjusted to the child's preferences to increase the relaxation effect, because the music that children like tends to lower anxiety more significantly than unfamiliar music (Liu et al., 2022). During therapy, children are accompanied by nurses and researchers, while parents are allowed to attend to provide a sense of security. If the child shows discomfort, the session can be temporarily stopped according to the principles of comfort and safety. After the entire session is over, a posttest is performed with the same instrument to assess changes in anxiety levels. All procedures are carried out consistently on each child to maintain the internal validity of the research. To avoid bias, no other psychological interventions were given at the same time, such as play therapy or fairy tale therapy.

Data analysis was carried out using SPSS version 26.0. The Shapiro–Wilk test is used to assess the normality of data. Because the results showed abnormal distribution ($p < 0.05$), the analysis of the difference between the pretest and posttest was carried out with the Wilcoxon Signed Rank Test. This test is suitable for ordinal data with small sample counts. The significance value is set at $\alpha = 0.05$. Descriptive analysis was also conducted to describe the distribution, median, and changes in children's anxiety scores before and after the intervention.

With a systematic and controlled approach, this research method is expected to provide an empirical picture of the effectiveness of music therapy on reducing children's anxiety during hospitalization. The selection of appropriate designs, instruments, and methods of analysis is expected to produce scientific evidence that can support the application of music therapy as a nonpharmacological intervention in pediatric nursing practice in hospitals.

RESULT

The *Wilcoxon Signed Rank Test* showed values of $Z = -6,797$ and $p = 0.000$ ($p < 0.05$), which means that there was a significant difference between anxiety levels before and after children's

music therapy. From the results of the intervention, it was known that the song "Cicak-cicak di dinding" was chosen the most (4 out of 10 children, 40%), followed by *Cocomelon* (20%) and *Baby Shark* (20%). This shows that simple, familiar, and soft-rhythmic local children's songs are preferred by preschool and early school age children.

Table 1.

Changes in children's anxiety levels before and after children's music therapy (n=10)

No.	Respondent Name	Selected Music Type	Before Anxiety Score	Anxiety Score After	Change	Category
1	An. F	<i>Cocomelon</i>	5	2	-3	Decreased
2	An. A	Cicak-cicak di dinding	4	2	-2	Decreased
3	An. S	<i>Baby Shark</i>	5	1	-4	Decreased
4	An. M	Cicak-cicak di dinding	4	2	-2	Decreased
5	An. Sa	Cicak-cicak di dinding	5	3	-2	Decreased
6	An. Q	<i>Naik Ke Puncak Gunung</i>	4	2	-2	Decreased
7	An. G	Cicak-cicak di dinding	5	3	-2	Decreased
8	An. K	<i>Climb to the top of the mountain</i>	4	2	-2	Decreased
9	An. Am	<i>Baby Shark</i>	5	1	-4	Decreased
10	An. Fat	<i>Cocomelon</i>	4	2	-2	Decreased
	Average	—	4,53	2,17	-2,36	Significant decline

DISCUSSION

The results of this study showed a significant decrease in children's anxiety levels after being given children's music therapy during hospitalization. The average anxiety score decreased from 4.53 to 2.17 with Wilcoxon's test results showing $p = 0.000$ ($p < 0.05$). These results confirm that children's music therapy is effective in reducing anxiety in hospitalized children, both from emotional, behavioral, and physiological aspects. This decline illustrates that music plays not only as entertainment, but also as a form of therapeutic intervention that affects the child's nervous and emotional systems as a whole. These findings are in line with the research of Hakim et al. (2023) who proved that listening to non-verbal music for three consecutive days with a duration of 20 minutes per session was able to significantly reduce children's anxiety ($p < 0.001$). Neurophysiologically, music is able to stimulate the limbic system and hypothalamus which play a role in emotion regulation and increase the release of neurotransmitters such as endorphins and dopamine which cause feelings of comfort and relaxation (Wijaya & Wulaningsih, 2025; Febrianti & Anggraini, 2022).

Music therapy works through complex and multidimensional mechanisms. According to neuropsychological theory, music is able to modulate the activity of the autonomic nervous system by decreasing the activity of the sympathetic nervous system and increasing parasympathetic activity, resulting in physiological effects in the form of decreased heart rate, blood pressure, and respiratory frequency (Baskara & Zulaikha, 2020). The activation of alpha waves in the brain that occurs when listening to music in slow rhythms promotes feelings of calm, focus, and high concentration (Wadu & Mediani, 2021). Thus, music has a noticeable relaxation effect on the child's stress response during hospitalization. Hospitalization conditions full of stressors such as the sound of medical devices, antiseptic odors, invasive procedures, and unfamiliar environments can cause anxiety and fear in children. Music acts as a balancing medium between stressful conditions and the child's psychological need to feel safe.

The significant reduction in anxiety levels in this study also showed that music played a role as a positive distraction. According to the distraction theory, the focus of the child's attention being diverted to a pleasurable stimulus (in this case music) will reduce the perception of fear and pain that usually arises during hospitalization (Karbandi et al., 2020). Audio distractions such as music have been shown to be more effective than single visual distractions because they are able to

involve the emotional and cognitive dimensions simultaneously. This is reinforced by research by Bar et al. (2023) through a systematic review of 15 randomized clinical trials that found that listening to music before or during invasive procedures consistently lowered children's anxiety and pain perception. This effect increases when children are given the opportunity to choose the type of music they like. In this study, the song "Cicak-cicak di dinding" was the type of music that most children chose (40%), showing that songs with simple and familiar melodies had a greater emotional effect than new or foreign music.

Traditional children's songs like "Cicak-cicak di dinding" have a slow tempo, repetitive melodies, and a simple tone structure that preschoolers can easily remember. According to Piaget's theory of cognitive development, preschool-age children are at a preoperational stage where the thinking process is still concrete and is heavily influenced by sensory experiences. Therefore, music that is easy to sing and remember tends to be more effective in triggering feelings of security, joy, and comfort. These findings are also in line with the results of research by Sholikha et al. (2022) which showed that popular children's songs such as "Hey Tayo," "Baby Shark," and "Cocomelon" reduced hospitalization stress by 13.3% due to their familiar, rhythmic, and fun nature. In addition, music with a moderate to slow tempo can slow down the heart rate and lower blood pressure, which is physiologically related to decreased anxiety.

From a psychological perspective, music has a function as a medium of expression and non-verbal communication for children. Children who are hospitalized often have difficulty expressing fear, pain, or discomfort with words. Music provides a safe channel to channel those negative emotions. Through singing, movement, or rhythmic beats, children can express their feelings without verbal pressure. Research by Rianti & Sukmawati (2023) shows that children who are given music therapy during invasive procedures show fewer symptoms of anxiety such as crying, refusing treatment, or chills. Music serves as a bridge between the child's emotional world and the rigid hospital environment, creating a safe space for them to adapt psychologically.

From the social aspect, listening to music with family provides double benefits. First, the presence of parents during therapy sessions increases the sense of security and strengthens the emotional bond between the child and the parents. Second, the positive interactions that arise while listening to or singing songs together foster enthusiasm and reduce tension. Knott et al. (2022) found that music therapy improves positive communication between children, families, and health workers, improves therapeutic relationships, and improves children's coping with medical procedures. Similar findings were also reported by Andiny et al. (2023) that Islamic music therapy was able to significantly reduce children's anxiety by combining elements of spiritual relaxation and melody familiarity. This suggests that cultural and spiritual contexts have an important influence on the effectiveness of music therapy.

Islamic music, for example, contains elements of repetition, gentle harmonies, and soothing lyrics. In Indonesian culture, music like this is very much in line with the spiritual values of the community that emphasizes patience and calmness. The spiritual effect of music not only creates inner peace but also increases the child's acceptance of stressful medical experiences. Zhang et al. (2023) added that music therapy improves emotional regulation abilities in children with chronic diseases such as asthma, helping them turn negative emotions into positive ones. Thus, music therapy is not just a method of distraction, but a holistic approach that affects the balance of emotions, cognition, and physiology of children.

Physiologically, research by Febrianti & Anggraini (2022) found that listening to music for 15–20 minutes per session can significantly reduce children's cortisol hormone levels, heart rate, and blood pressure. This indicates that music therapy plays a direct role in the autonomic nervous system and hormones related to stress. When music is processed by the auditory system, nerve

impulses are sent to the limbic, amygdala, and hypothalamus systems that regulate emotions and stress. The activation of this pathway provokes the release of endorphins, which induce a feeling of comfort and lower muscle tension. Wadu & Mediani (2021) emphasized that music activates alpha and teta brain waves, promotes deep relaxation and decreases sympathetic nerve activity which usually increases when children experience hospitalization stress.

The effectiveness of music therapy can also be explained through the theory of Gate Control, in which music functions to close the gates of pain perception through the activation of large nerve fibers that inhibit the transmission of pain impulses to the brain (Melzack & Wall, 1965 in Hakim et al., 2023). Thus, music not only lowers anxiety but also lowers the child's perception of pain during medical procedures. This is especially relevant in pediatric nursing practice, where children often experience pain from procedures such as injections, IVs, or blood draws.

In addition to providing a direct therapeutic effect, music therapy also has practical implications in the context of child nursing. Music can be applied easily, does not require special tools, and can be adapted to the child's conditions and preferences. For nursing personnel, music therapy is an effective, economical, and safe non-pharmacological intervention to reduce anxiety and improve the comfort of pediatric patients (Wijaya & Wulaningsih, 2025). In the context of health services in Indonesia, this intervention is relevant because it is in line with the principles of holistic nursing care that emphasizes a balance between the physical, psychological, social, and spiritual aspects of the patient.

Furthermore, the results of this study show that the integration of music therapy in standard pediatric nursing operational procedures is very possible. Nurses can use music as part of a therapeutic communication approach with a child experiencing hospitalization stress. For example, the nurse may play a favorite child's song during a treatment procedure or at a specific time in the child's daily care schedule. This approach is expected to be able to create a more child-friendly hospital environment, reduce anxiety levels, and improve the quality of the hospitalization experience for children and their families.

Overall, the results of this study reinforce the empirical evidence that children's music therapy is an effective, inexpensive, easy to apply, and has no side effects. The positive effects include a decrease in physiological response to stress, increased emotional relaxation, improved social relationships, and increased children's adaptation to the hospital environment. Therefore, it is important for pediatric nurses in the inpatient setting to integrate music therapy into the nursing care plan as part of the child's anxiety management strategy during hospitalization.

CONCLUSION

This study concludes that children's music therapy is effective in reducing anxiety levels among hospitalized children. Based on the Wilcoxon Signed Rank Test, the p-value of 0.000 ($p < 0.05$) indicates a significant difference between pre- and post-intervention anxiety scores. The average anxiety score decreased from 4.53 (severe anxiety) to 2.17 (not anxious), demonstrating that music therapy produces a meaningful reduction in children's anxiety during hospitalization. These findings confirm that children's music therapy can serve as a beneficial non-pharmacological intervention to help manage anxiety in pediatric inpatient settings.

REFERENCES

- Ali, L., Jacob, C. M., & Wang, J., et al. (2024). Hospitalization and new mental health diagnoses in children: A retrospective cohort study. *BMC Psychiatry*, 24, 118.
- Ali, S., Thurman, J., & Kellerman, T. (2024). Hospitalization and subsequent anxiety disorders among children: A retrospective cohort study. *Journal of Pediatric Psychology*, 49(3), 215–226.

- Andiny, F., Rahmawati, D., & Ningsih, R. (2023). The effectiveness of Islamic music therapy on children's anxiety during hospitalization. *Indonesian Journal of Child Nursing*, 11(2), 87–94.
- Andiny, M., Novikasari, L., & Furqoni, P. D. (2023a). The effect of Islamic music therapy on children's anxiety levels due to hospitalization. *Perak Malahayati Journal*, 5(2), 133–139.
- Andiny, M., Novikasari, L., & Furqoni, P. D. (2023b). Socialization of the benefits of Islamic children's song music therapy to reduce anxiety due to hospitalization at Sakai Sambayan, Bandar Lampung. *Perak Malahayati Journal*, 5(1), 25–31.
- Bagnasco, A., Peiró, A., & Sasso, L., et al. (2020). Validation of the Facial Image Scale for assessing anxiety in hospitalized children. *Journal of Pediatric Nursing*, 55, 58–63.
- Bar, A. M., Monalisa, M., Damayantie, N., & Halimah, H. (2023). Music therapy for pain and anxiety in hospitalized children: A systematic review of randomized controlled trials. *NSC Nursing Journal*, 4(1), 14–21.
- Bar, D., Lewis, H., & Patel, R. (2023). Music intervention in pediatric care: A systematic review of randomized controlled trials. *Journal of Pediatric Nursing*, 72, 125–136.
- Bar, S., Kim, H., & Lee, M. (2023). The effect of music therapy on anxiety and pain in pediatric patients: A systematic review of randomized controlled trials. *Frontiers in Psychology*, 14, 1179021.
- Baskara, A. S., & Zulaikha, F. (2020). The effect of music therapy on pain and anxiety responses in preschool-aged children. *Borneo Student Research*, 2(1), 75–81.
- Creswell, J. W., & Guetterman, T. C. (2024). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). Sage Publications.
- Febrianti, N., & Anggraini, M. (2022). The effect of music therapy on cortisol levels, blood pressure, and pulse rate of hospitalized children. *Indonesian Journal of Medical Nursing*, 10(3), 112–120.
- Field, A. (2022). *Discovering statistics using IBM SPSS statistics* (6th ed.). Sage Publications.
- Ghasemi, A., & Zahediasl, S. (2021). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, 19(1), e110122.
- Hakim, A., Kaldozkhi, S., & Tashakori, A., et al. (2023). Effects of non-verbal music on anxiety in hospitalized children: A quasi-experimental study. *BMC Pediatrics*, 23(2), 112–119.
- Hakim, R., Fahimah, A., & Nurhadi, A. (2023). Effect of instrumental music on anxiety levels among hospitalized children. *Indonesian Journal of Nursing Research*, 10(2), 87–94.
- Hakim, R. F., Anisa, D., & Rahayu, P. (2023). The effect of music therapy on reducing children's anxiety levels during hospitalization. *Indonesian Journal of Child Nursing*, 5(3), 201–210.
- Hakim, R., Dewi, L., & Rahmadani, F. (2023). Non-verbal music therapy in reducing children's anxiety during hospitalization. *Journal of Comprehensive Nursing*, 9(1), 23–31.
- Karbandi, S., Hosseini, S. M., & Sadeghi, T. (2020). The effects of music and visual distraction on anxiety in hospitalized children with chronic illness. *Iranian Journal of Nursing and Midwifery Research*, 25(4), 304–310.
- Knott, A., Davis, P., & Harrington, J. (2022). Family-centered music therapy and its effects on communication and emotional well-being in hospitalized children. *Pediatric Nursing Review*, 58(2), 145–153.
- Koenig, J., Parzer, P., & Voss, A. (2022). Physiological effects of music listening on the autonomic nervous system in children. *Child and Adolescent Mental Health*, 27(4), 347–356.
- Liu, Y., Zhang, H., & Chen, S. (2022). Music therapy interventions for hospitalized children: A meta-analysis of anxiety outcomes. *Pediatric Nursing*, 48(6), 312–321.
- Melzack, R., & Wall, P. D. (1965). Pain mechanisms: A new theory. *Science*, 150(3699), 971–979.
- Polit, D. F., & Beck, C. T. (2022). *Nursing research: Generating and assessing evidence for nursing practice* (11th ed.). Wolters Kluwer.
- Putri, A. D., & Dewi, S. N. (2024). Effectiveness of music therapy on reducing children's anxiety during hospitalization: A literature review. *Journal of Sriwijaya Science and Nursing*, 7(1), 12–21.

- Rahmadani, L., Putri, A. D., & Dewi, S. N. (2023). Reliability and validity of the Facial Image Scale (FIS) in preschool-aged children in Indonesia. *Indonesian Journal of Child Nursing*, 5(2), 101–109.
- Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global prevalence of anxiety and depression in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatrics*, 175(11), 1142–1150.
- Rianti, D., & Sukmawati, S. (2023). Music therapy as a non-pharmacological distraction to the child's anxiety during invasive measures. *Journal of Pediatric Nursing Nusantara*, 8(2), 67–75.
- Sholikha, N., Wibowo, A., & Fitria, N. (2022). The effectiveness of popular children's songs on reducing hospitalization stress in preschool-age children. *Journal of Maternal and Child Health*, 5(3), 201–210.
- Snyder, K., & Mendoza, L. (2023). Quasi-experimental designs in pediatric nursing research: Practical and ethical considerations. *Journal of Pediatric Nursing*, 68, 45–54.
- Ullah, R., Khan, S., & Nazir, H. (2022). Impact of music therapy on emotional regulation in hospitalized school-aged children. *Journal of Pediatric Nursing*, 63, e42–e49.
- Wadu, F., & Mediani, H. S. (2021). The effect of music therapy on brain waves and relaxation in children experiencing hospitalization stress. *Journal of Psychiatric Nursing*, 9(1), 22–29.
- Wang, Y., He, L., & Zhou, Q. (2024). Music therapy for reducing preoperative anxiety in children: A systematic review and meta-analysis. *Journal of Clinical Nursing*, 33(5–6), 945–958.
- Wijaya, U., & Wulaningsih, I. (2025). Anxiety management in preschool-aged children who experience hospitalization using puzzle play tools. Deepublish.
- Zengin, N., Yildirim, S., & Basar, F. (2023). Effectiveness of music therapy in decreasing anxiety among hospitalized children undergoing invasive procedures. *Clinical Child Psychology and Psychiatry*, 28(2), 445–459.
- Zhang, L., Chen, Y., & Wu, H. (2023). Music therapy improves emotional regulation in children with asthma: A randomized clinical trial. *Complementary Therapies in Clinical Practice*.