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NON-PHARMACOLOGICAL PAIN MANAGEMENT IN PEDIATRIC CANCER PATIENTS

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ABSTRACT

Pediatric patients with cancer experience a common symptom which is chronic pain that majorly affects their quality of life, treatment, and recovery process. Cancer-related pain among this group of patients is specifically challenging due to their inability to perceive or express pain as easily as adults. Pharmacological pain management methods are widely used but, in some cases, complications such as high dependency and parental misconceptions call for the need of alternative interventions. The key concepts of this thesis demonstrate how non-pharmacological interventions are used integratively with pharmacological methods to lower pain and distress in children diagnosed with cancer.

There exists a knowledge gap among healthcare professionals and caregivers concerning the care of children and adolescents according to their individual cancer-pain and treatment needs. Moreover, general principles applying to adults with cancer are used in the treatment of pediatric patients which is problematic because the younger population require specialized attention. This article is therefore significant in covering the contextual and knowledge gaps in the pain management of cancer-related pain among children and adolescents. The purpose of this study was to identify the effectiveness of different non-pharmacological techniques in reducing pain among pediatric cancer patients.

This paper utilizes a descriptive literature review method, involving the synthesis of 25 articles published over the last 11 years and peer-reviewed. Key databases, including PubMed and CINAHL library were utilized for the research process and selection of relevant studies. The data were analyzed through inductive content analysis to identify recurring themes, effective practices, and gaps in existing research. The key concepts of this study highlight various non-pharmacological methods including massage therapy, acupuncture, and physiotherapy/exercise, music, art, and play therapy, psychological and behavioral interventions as well as technology-based methods such as virtual reality for distraction and mobile apps for interaction. However, inadequate knowledge and training for healthcare providers, barriers to implementation and cultural considerations and regulation theories were also identified.

In conclusion, these non-pharmacological strategies are effective if used integratively, with adequate training of nurses and delivery of insights to caregivers and patients on overcoming cultural fears as well as misconceptions.

Keywords: Nonpharmacological, pain management, pediatric cancer

CONTENTS

1 INTRODUCTION

It is approximated that worldwide 400,000 pediatric patients aged 0 – 19 years get a cancer diagnosis annually (Comparcini et al. 2023). A common symptom among this population is pain, which varies based on the type of cancer and the organ(s) affected. The pain may arise from the cancer itself or as a result of a treatment or procedure, with the procedural pain reportedly causing more distress to the child than the actual cancer or tumor. (Kamsvåg et al. 2024.) In pediatric patients, this treatment-associated pain may occur due to mucositis, infections such as typhlitis, postsurgical pain, chemotherapy interventions, spinal taps, aspiration of the bone marrow, insertion of a catheter to the central venous port, or needle procedures (Jibb et al. 2015).

In pediatric patients, highly prevalent pain is still undertreated in up to 50% of these patients due to improper and inappropriate management of pain (Madi et al. 2023). Untreated pain in children and adolescents has a significant impact on quality of life and the psychological aspect of their lives, in addition to its complication causing to the healing process. Opioids are widely prescribed for acute and chronic pain relief in pediatric oncology. Despite their efficacy as a treatment, opioids have negative side effects such as, but not limited to; cognitive and digestive malfunction, respiratory failure, risk of dependance and addiction, and hypersensitization to pain. Given the impact that opioids can have, the highest standard of pain treatment in pediatric patients should be offered multimodally, which involves the combination of both pharmacological and non-pharmacological ways. (Wren et al. 2019.)

Non-pharmacological techniques used in an integrative approach can reduce the dependence on opioids in children and adolescents by providing long-term advantages in the management of pain (Wren et al. 2019). They are also highly preferred by some parents over pharmacological interventions as they eradicate the fears of the impact of analgesics and sedation on their children (Yan et al. 2021). As opposed to short-term pharmacological methods which offer patients temporary relief, integrative non-pharmacological methods can give lasting relief

by changing circuits in the brain that target cognitions, emotions, behaviors, and sensory perceptions (Wren et al. 2019). According to a study, up to 49% of pediatric cancer survivors still experience pain many years after their diagnosis, which necessitates considering long-lasting interventions (Caru et al. 2023).

As this integrative approach is gradually adopted, the implementation of these non-pharmacological measures is limited due to barriers such as low awareness levels or misconceptions about their effectiveness. The care regimens for pediatric cancer patients often involve them spending more time at home than in the hospital therefore parents or relatives are highly responsible for their pain management. (Simon et al. 2021.) In the majority of outpatient settings, parents are involved in the decisions regarding choosing pain control options. Studies show that there exists incorrect perceptions among parents about pain in cancer, like the lack to recognize consequences from untreated pain's kids, so more knowledge to parents of these concepts is necessary. (Yan et al., 2021.) Some parents also believe that pain in cancer patients cannot be avoided in any way (Simon et al. 2021). On the other hand, among healthcare professionals, nurses and doctors emphasize the need for more time and training in pain management principles whereby nurses express a higher need (Kamsvåg et al. 2024).

It is imperative to address this problem of inadequate knowledge among patients, caregivers, and healthcare professionals by providing guidelines based on evidence. Therefore, the purpose of this study is to assess the effectiveness of various non-pharmacological pain management interventions for pediatric cancer patients, including physical interventions (massage therapy, acupuncture, and physiotherapy/exercise), therapies such as music, art, and play therapy, psychological and behavioral interventions as well as technology-based methods such as virtual reality for distraction and mobile apps for interaction.

2 THEORETICAL FRAMEWORK

2.1 Pain management models

In choosing pain management interventions, the appropriate method is applied based on the correct assessment of pain. As opposed to adults, it is more challenging to evaluate and treat pain in an effective manner in children due to their perception and expression of pain. Moreover, ineffective pain management is driven by the persistent myths among parents and healthcare workers surrounding the inability of pediatric patients to sense pain. The most accurate and reliable way of evaluating the pain level is through a verbal report from the child, especially because the experience of pain is subjective. However, when the child is unable to express verbally for example due to underdeveloped speech or age, an acceptable alternative is assessment tools based on observation and behavior. (Kahsay 2017.)

The common pain assessment scales in children who can communicate are NRS and VAS scales as well as the facial scale. In special groups of kids such as those with disabilities, pain assessment is particularly difficult and requires a heightened level of attention due to their inability to report the pain. (Kahsay 2017.) In addition to age, another factor making pediatric patients highly vulnerable to inadequate pain management is their high reliance on their parents or caregivers for pain intervention methods (Yan et al., 2021).

2.2 Technology-based interventions

According to research conducted in the Netherlands (Loeffen et al. 2020), technology-based interventions, in which a child is actively involved, are a form of active distraction which is a psychological method in the management of cancer pain. The mechanism of active distraction, for example engaging in a computer game, reduces emotional distress and discomfort arising from cancer-related procedures such as needle processes (Loeffen et al. 2020). Common forms of technologies discussed in this study for pediatric cancer patients are Virtual Reality (VR) as a means of distraction, and interactive smart applications for

social interaction, pain control through assessments as well as evidence-based professional advice.

In virtual reality, the patient is engaged in a virtual environment that gives a realistic feel through the use of three-dimensional visual inputs and auditory equipment (Comparcini et al. 2023). As discussed in detail by Ioannou et al. (2020), VR triggers an interaction and real-time response from the participant. However, VR can be classified as either non-immersive or immersive based on how the participant is isolated from the immediate surroundings when engaging in the virtual setting. In the non-immersive type, equipment used has analog graphics and only allows the patient to watch, for example, through a large monitor or wall-mounted display, whereas in the immersive VR, special equipment that tracks motion is used to simulate a full engagement in the virtual scene. (Comparcini et al. 2023.)

VR distraction works by demanding more attention from the child and consequently decreasing the extent to which cancer pain is perceived. The more attention a distraction demands, the less pain is perceived. This form of distraction is based on the fact that pain has a great attention-drawing reaction due to the brain's alertness to possible damage to the tissue. Therefore, through this concept, altering the focus through VR distraction lessens the intensity of pain and changes how the brain receives signals of pain. (Amali & Chavan 2023.) In pediatric oncology, the VR technique of distraction can be integrated into procedures that require access to the vein such as TIVADs (Caballero et al. 2024).

Additionally, mobile applications are an alternative form of technology-based distraction for cancer pain in the pediatric population. The cancer care plan greatly involves an independent aspect of pain management from home that could be overwhelming to pediatric patients and their families. (Simon et al. 2021.) To ease pain intervention while at home, some apps including the "Pain Squad+", the "Pain Buddy Program", the "KLIK monitor app" and the "Color me Healthy app" have already been developed and implemented. They are designed

to aid in the pain assessment and monitoring process and enable follow-up between healthcare professionals (HCPs) and the children's families. The KLIK app's features enable the patients to record their pain scores, and a notification is automatically sent to the HCPs when an alarming score is documented. For proper guidance and clarity, a brochure on the usage of the app is usually given to patients and their families. (Simon et al. 2021.) The user interface of the family or patient is more detailed and informative and differs from that of the HCP (Figure 1).

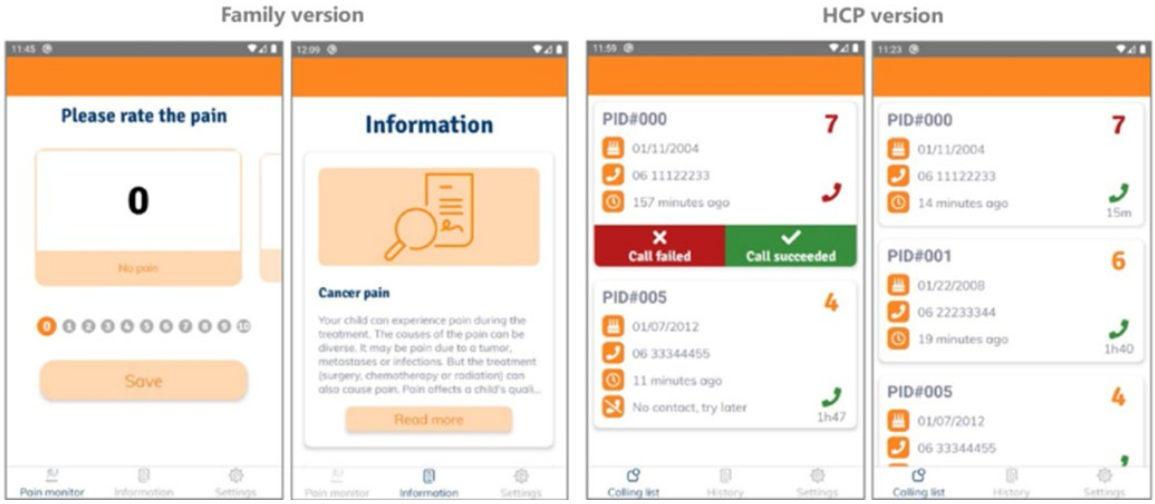

Figure 1. Family and HCP version of the KLIK Monitor app (Simon et al. 2021)

Mobile applications also utilize the concept of social interaction and peer communication through smartphones for therapeutic purposes in the management of cancer pain. Considering cancer pain is greatly interlinked with the psychological aspect of the child's well-being, connecting socially through an app that preferably has a virtual or real-time approach is a useful mechanism to lessen the pain. Importantly, pediatric cancer patients should be able to communicate with their peers who also have a cancer diagnosis for emotional support. In the design of these health apps, other general features to consider include gamification aspects for a higher appeal to the patients, user-friendliness and learnability, ease of language, and internet accessibility. (Madi et al. 2023.)

2.3 Physical interventions

Physical interventions such as acupuncture, massage, and regulated exercise have been evaluated as physical techniques in the management of cancer pain in children. In acupuncture, tiny needles are placed in different parts of the body (acupoints) to relieve pain. Similar therapies related to acupuncture include acupressure, stimulation of acupoints through lasers or non-invasively, moxibustion (generating localized heat), and electroacupuncture. Through MRI tests, the modes of operation through which acupuncture affects pain levels have been observed. Acupuncture changes the flow of blood in the brain which in turn alters the normal functioning of the emotion system in the brain consequently affecting pain perception. (Singh & Chatuverdi, 2015.) Moreover, this needle placement technique works by triggering the release of endorphin hormone which plays a major role in the pain relief effect in the body. Additionally, in the treatment of pediatric cancer patients, acupuncture is beneficial in decreasing withdrawal caused by opioids as well as decreasing the dose and duration of opioid treatment. (Deng, 2020.)

As discussed by Caru et al. (2023), the “Exercise is Medicine” strategy shows the potential advantages of including exercise as part of the treatment regimen for chronic cancer pain relief. Physical training of pediatric patients through exercise may be used integratively with medical treatment. However, integrating exercise greatly depends on the type of cancer and the organs affected. For example, if the cancer affects the bones, then a different approach is considered. The mode of action for exercise involves redirecting the sensation of pain as well as improving sensations in the body which eventually heightens the tolerance of pain. In addition, exercise activates regions in the brain that boost the functionality of the pain regulation process, consequently reducing pain sensitivity. (Caru et al. 2023.)

Moreover, through physiotherapy and regulated exercises, children and teenagers with cancer can reduce muscular or orthopedic pain that worsens due to inactivity and prolonged periods of sitting. Importantly, the psychological effect

on the patient should be prioritized when practicing exercise integration. Considering that the majority of the pediatric cancer population experiences chronic pain, failure to exercise is often linked with the fear of exacerbating pain through moving. In addition, the age of the child as well as the willingness of the family to incorporate exercise as a physical intervention should be considered. (Caru et al. 2023.)

Additionally, in pediatric oncology, a massage given in individualistic doses by a specialist or loved one produces a therapeutic effect. It often involves different techniques and is most effective for a short period per session, ranging from 20 - 45 minutes. Professionals such as nurses, physiotherapists, and masseurs often incorporate massage in children with secondary bone tumors to improve long-term functionality. This method of physical treatment can be used for outpatient as well as outpatient pediatric patients with the intensity of sessions ranging. (Rodríguez-Mansilla et al. 2017.)

2.4 Music, art, and play therapy

Music, art and play are also an important aspects of care. This is because these methods provide effective coping mechanisms that reduce pain. In this section, the aim is to explore each of these aspects and see how they help in pain management. First of all, Music as a pain management strategy has a well-established literature background. It is a non-pharmacological intervention that works very well because of the therapeutic properties of music. In children, the strategy works particularly well. Even in regular care, it is common to see physicians in pediatric units distracting children with some form of music. Things are not much different in oncology facilities. When children listen to music, they focus of the sensory experience created by the music. This distracts them from the pain and therefore makes them relax. According to Fedhila et al., this relaxation is even more pronounced because the melodic elements of music sometimes align with the body’s natural rhythms. This creates an environment for further relaxation and therefore reduces pain. (Fedhila et al. 2023.)

On the other hand, art works because it provides children with an outlet for their pain. Pediatric patients in oncology suffer not only from pain but also anxiety and fear over the uncertainty of their life. Pediatric patients see their family worried and can get depressed from spending a lot of time in health facilities. Art therapy provides a way to work through these sensory inputs. The art therapy also helps to reduce pain by distracting the pediatric patients. Art therapy includes activities such as drawing, painting, and sculpting. All these methods can have the children externalize their pain and emotions. This therapy is particularly useful for children who are not able to express their distress verbally. Art therapy is a critical way through which caregivers and physicians can gain insights into the child's emotional state even when the child is not able to speak. This helps the caregivers apply more accurate care interventions. (Motlagh et al. 2023.)

In addition, play therapy plays the same roles as music and art. Play is an important aspect of children's growth and it is especially important that the small children in oncology care can continue to play. While play is generally important for all children, for children in oncology, it is critical to give them a feeling of normalcy and distract them from pain. Play can help children cope with painful procedures because they are distracted from the pain. Additionally, play is essential for the physicians and caregivers to communicate complex instructions to children in a way that the children can understand. This makes it an important aspect of care. (Cooper & Nelson, 2015.)

2.5 Psychological and behavioral interventions

Among the psychological and behavioral interventions that might be useful for pain management include hypnosis, guided imagery, relaxation techniques and cognitive behavioral therapy. This section will try to see how each of these methods can assist in pediatric oncology pain management. *Hypnosis* is a useful technique for children who are dealing with chronic pain situations and painful medical procedures. It is a psychological intervention in which a trained therapist can guide the patient into a state of focused attention. This leads to deep relaxation. When a child is in this state, they are more open to suggestion. The

physician can use this opportunity to alter the child's perception of pain and also reduce their anxiety. It is argued that one of the important benefits of using hypnosis is that it is non-invasive. It is therefore useful for repetitive pain management for example headaches, stomach aches and recurrent medical procedures. (Singh & Chatuverdi, 2015.)

Guided imagery therapy is not very different from hypnosis. In this method, the child is taken through a series of mental images. These images are careful selected to curate an environment where the child can become calm and relaxed. For example, the child is taken through a series of pictures where they visualize peaceful and safe spaces. This not only reduces physical pain but also helps to reduce emotional stress. This method is great because it helps children learn to control their pain. When the children are able to control their pain by looking at images, they realize that this is something they can achieve. They are therefore able to build up a system where they can manage pain through their own imagination. The guided imagery is also useful because it can be highly tailored to the specific child's interest. It is therefore a technique that can be used easily with many children. (Singh & Chatuverdi, 2015.)

A third technique that is used is the application of various relaxation techniques. Some of the techniques that are used are deep breathing exercises and relaxation of muscles progressively. These techniques are amongst the most common in pain management among the pediatric population. They reduce stress and anxiety which are among the highest contributors of pain. Among the advantages of these methods is ease of use. Deep breathing involves teaching the child to take slow but deep breaths. This is a widely known technique for calming down the nervous system. It is therefore important in reducing the perception of pain. The relaxation of muscles involves a systematic tensing and releasing of various muscles. Other than promoting physical relaxation, this activity reduces muscular tension. This tension is usually associated with pain in oncology treatment. Another benefit of these techniques is that they are easily teachable and children can continue using them for pain management when the caregiver is not present. (Jong et al. 2020.)

Of these three methods, cognitive behavior therapy (CBT) is more structured. This is evidenced based practice that involves a goal-oriented psychological intervention. It focuses in changing negative thought patterns and behaviors. The perception of pain is one of these negative thoughts and patterns that can be managed. Using CBT, the child's thought process is reframed as well as their perception of pain. It is useful for instances where children suffer chronic pain that they perceive as unmanageable. CBT can be used to reframe this mindset and children can be made to believe that the pain is manageable. CBT is self-reinforcing because once a child is able to do what they thought would be undoable, they will henceforth believe that the situation is manageable. CBT therefore advances the resilience of a child even in the long run. (Singh & Chatuverdi, 2015.)

2.6 Summary of theoretical framework

This framework gives the basis of this research by showing the theories revolving around pain management as well as the various interventions used in non-pharmacological methods for pediatric cancer patients. It is crucial in apprehending how strategies such as virtual reality, mobile apps, music, art and play therapy can ease the pain experience. The main concepts include a merge of both physical and psychological ways to control cancer pain and distress in the treatment process. It also highlights the important pain assessment tools in

implementing a holistic cancer care approach. By enhancing the understanding of pain interventions, this framework is especially relevant to healthcare professionals and caregivers in improving patient care and optimizing the potential of these non-pharmacological methods (Figure 2).

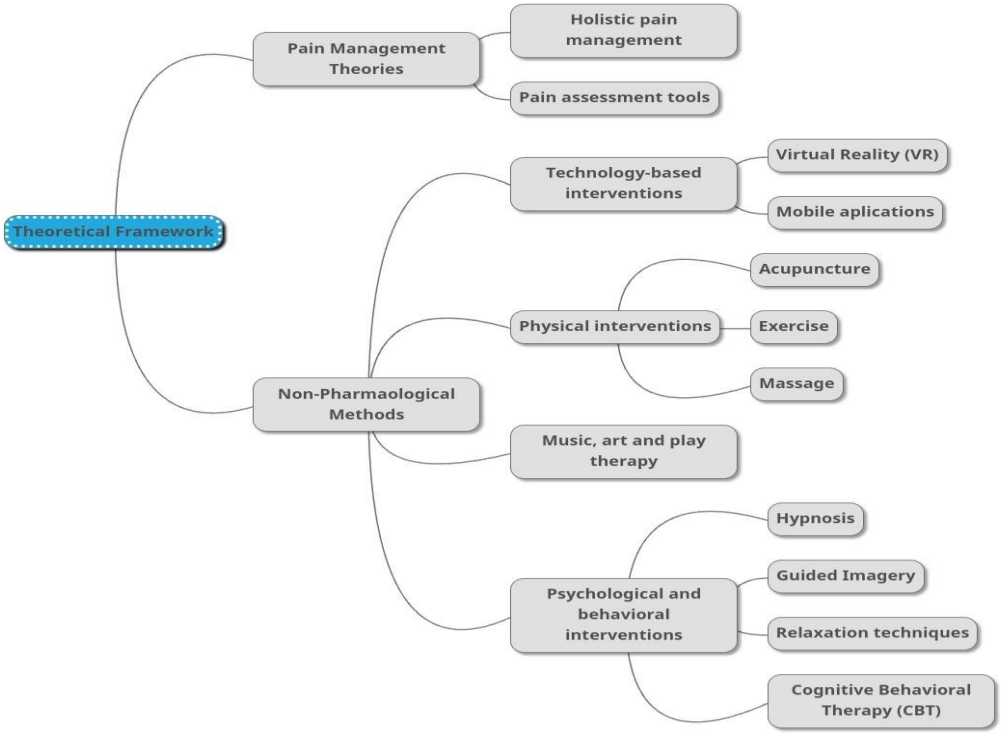

Figure 2. Mind map of the theoretical framework

3 PURPOSE, AIM & RESEARCH QUESTION

The purpose of this research is to identify the effectiveness of different non-pharmacological techniques in reducing pain among pediatric cancer patients. The research aims to enlighten healthcare professionals and caregivers on the most effective non-pharmacological techniques for reducing pain in pediatric cancer patients. The research question of this paper, therefore, is: *How effective are different non-pharmacological techniques in reducing pain among pediatric cancer patients?*

4 METHODOLOGY

4.1 Descriptive literature review

Literature reviews are a very important part of research as they form the backbone of knowledge advancement. Evaluating various written literature by different authors gives one a better understanding and recent status of what is happening in their field (Paré & Kitsiou 2016). Literature reviews help researchers find existing gaps or further areas of study in a certain field or subject. A descriptive literature review involves summarizing and analyzing already existing literature with no specific methodology. This form of literature review focuses on discussing and interpreting various research findings rather than strictly following a methodological review. (Watson 2019.)

In this thesis, we used the descriptive literature review with a systematic search approach, to identify, assess, and synthesize existing literature relevant to the research topic and research question. The goal of this method was to give a comprehensive overview of the current knowledge, identify existing gaps in the literature, and specify areas where further research is needed. Firstly, we engaged in the planning stage which involved finding a research topic and generating a research question. The aim was to have a research topic that is clear to the point and unique but most importantly, a topic of high value to the research field. The general idea was based on pain management, specifically for cancer patients. We therefore conducted original research of studies from various databases (Pubmed and CINAHL) to investigate if our topic would have enough data.

However, this initial topic, which was ‘pain management in cancer patients’ was too broad and numerous studies were available, making it too tedious to analyze the data. Moreover, the immense data proved that the topic was already highly researched and therefore did not meet the criteria of being unique. After this initial research, we conducted a second and more thorough dive into the existing data, to aid in the narrowing down of the topic. Upon researching, we discovered

a literature gap in the pain management of pediatric patients. Moreover, we discovered that there was a knowledge and contextual gap concerning non-pharmacological interventions among healthcare professionals and caregivers. As a result, we were able to formulate a research question and settle on the thesis topic.

After finding a research topic and defining the aims of the study, we continued the literature search process. This involved using specific search terms in electronic databases to generate relevant results. Since there was a bulk of data, we applied various inclusion and exclusion criteria for the articles. This helped in narrowing down our results while maintaining the relevance and acquiring the most recent studies. When obtaining articles, we also checked the studies cited by the writers and picked out those that aligned with our research topic. In analyzing the data and synthesizing it, we utilized tables to summarize the data and highlight key gaps. This helped in creating a draft for our literature review and eventually made the writing process easier.

4.2 Research process

A total of 25 studies were included in this review from electronic databases including PubMed and CINAHL. After screening some titles and scheming through abstracts for relevance, the number of articles chosen was about 35. Out of these, we only included 25 articles in the final review as they were relevant to our research topic. For evidence-rooted results, we targeted only scientific articles from the perspective of nursing children with cancer. The scientific articles in the review are journal articles comprising of systematic reviews and cross-sectional studies. The articles selected were only those with recent information, that is, published in the last 11 years (2013 - 2024). They were also restricted to the English language and had to be peer-reviewed for guaranteed quality. The articles excluded were those targeting general cancer patients and not specifically pediatric, as well as those addressing only one type of cancer. (Table 1)

Table 1. Inclusion and exclusion criteria of the studies

Inclusion criteria	Exclusion criteria
Articles published between 2013 - 2024	Articles published before 2013
Articles in English	Articles in other languages
Peer-reviewed articles	Articles with no peer review
Articles targeting pediatric patients	Articles with no pediatric patients included
Articles with free access to full text	Articles with no free access
Articles covering childhood cancer	Articles covering other types of cancers

For accurate results, the search words used were only those relevant to the title and purpose of the thesis. The search terms used included ‘nonpharmacological', 'child', 'cancer pain', 'pain management', 'cancer', 'pediatric', 'nursing', 'cancer patients', and nurse'. The Boolean conjunctions used were AND to ensure each search term in the combination appeared in the result, and OR to show that either of the search words selected could appear in the article. The operator NOT was not used in the research process. The choice of databases, search term combinations, and number of articles selected is demonstrated more in the information search process table (Appendix 1). Additionally, the scientific articles selected, their key findings, research methods, and results, are shown more in detail in the research articles table (Appendix 2).

4.3 Data analysis method

In this thesis, the literature was analyzed qualitatively using the inductive content analysis method. Through inductive analysis, a better understanding of the

content of the associated group of data is produced, and therefore this method is qualitative (Paré & Kitsiou 2016). This method of analysis is often suitable for research in the health field specifically in research that is of limited scope and not complex. It is very beneficial when the objective of the research is to understand the topic under review in a manner that the results have direct practicability and relevance to healthcare professionals. As opposed to thematic analysis, inductive analysis is not merely theoretical or descriptive. It involves expounding and explanation of data. (Vears & Gillam 2022.) In this thesis, inductive content analysis of literature has produced practical interventions for managing pain in pediatric cancer patients.

In the research process, data analysis comes after the conceptualization of the research question(s) and the selection of data. The first step of inductive content analysis of data is reading and comprehending the data to get familiar with the content. This is then followed by arranging the data into general categories of text that are related to the research question. This initial process of coding is known as the identification of classes of meaning. After dividing the data into major classes, it is further divided into subcategories through a deeper dive into the data. (Popenoe et al. 2021.) This allows all the varying ideas in the data to be visible. Additionally, a third round of refining is conducted to ensure no subcategories are similar or point to the same idea. Finally, the data is synthesized to create an overall interpretation which results in forming a theoretical scope or framework of the study. (Vears & Gillam 2022.) In the context of this thesis, the analysis categories are demonstrated in the table of contents analysis (Appendix 3).

5 RESULTS

5.1 Nurses' knowledge and barriers in pain management

Nurses play a critical role in the management of cancer-related pain in pediatric patients. However, significant gaps in knowledge and practice have been identified, which impede effective pain management. (Uwimana et al. 2024.) A scoping review by Alsaiari et al. (2024) highlighted several barriers that nurses

face, including inadequate training, high workloads, and limited communication with patients. These barriers contribute to a significant challenge in pain management, where 30-50% of pediatric cancer patients undergoing treatment report experiencing pain, and this percentage rises to 70-90% among late-stage patients. Such statistics underscore the urgent need for enhanced education and support for nurses to improve pain management practices. (Alsaiari et al., 2024.)

The lack of standardized protocols and guidelines further exacerbates these challenges, leading to variability in the application and effectiveness of non-pharmacological interventions (Birnie et al. 2013). In low-resource settings, such as West Oromia, Ethiopia, only a small number of nurses have received formal training in pain management, and more than half reported a lack of resources as a significant barrier (Mekonen et al. 2024). This does not only happen in settings with low resources but also in high-resource areas, where the merging of nonpharmacological pain interventions is often faced with the same barriers such as inadequate organizational support, time limitations, and lack of continuous training platforms (Ferrel et al. 2019). To solve these issues requires combined effort to establish and carry out training frameworks for nurses to gain the skills as well as knowledge on how to competently use both non-pharmacological and pharmacological ways to treat pain (Uwimana et al. 2024).

5.2 Barriers to implementation and cultural considerations

Even though there are validated benefits of these non-pharmacological techniques, their application is hindered by several factors. One major barrier is the fact that protocols and policies around these pain interventions are not standardized, which causes inconsistencies in how they are applied, eventually contributing to ineffectiveness (Birnie et al. 2013). The inadequacy of trained professionals, specifically in settings with low resources, affects the broad integration of non-pharmacological methods. Additionally, this absence of regulations can cause discrepancies in the care and treatment outcomes, as not all patients will get the optimum benefit from these interventions.

In some instances, healthcare professionals may be reluctant to integrate non-pharmacological methods into their treatment plan due to unfamiliarity and uncertainty of their effectiveness. This unwillingness is heightened by the fact that these interventions often need more time and effort than the conventional pharmacological ways, therefore making them hard to consider in busy clinical environments. (Eccleston et al. 2014.) In addition, healthcare teams may be pressured by patients and families who are more inclined to pharmacological treatments and unwilling to explore other methods.

Cultural factors also majorly affect the openness and attitudes towards the use of some non-pharmacological ways. The reception of these interventions can be different among various populations, based on cultural practices, beliefs and systems. In some traditions for example, there may be more acknowledgement and preference to herbal medicine regimens than to integrative therapies, whereas in other cultures, there may be a higher acceptance to integrated approaches of pain management. When applying non-pharmacological methods, nurses and doctors should have cultural awareness and acknowledge the patient's system of beliefs or practices. In line with this, the professionals need to educate patients and their families on the advantages as well as limitations of these interventions while simultaneously addressing any assumptions or wrong perceptions they may have. (Stone et al. 2017.)

Ethical issues, specifically concerning informed consent, are also important in the application of non-pharmacological approaches. To ensure ethical working, it is essential that patients and their relatives are fully informed and that they fully comprehend the potential upsides and downsides of these interventions. This involves delivering clear and precise information about what the method encompasses, how it is implemented, and what results are expected. In certain cases, it may be necessary to get verbal approval from the child and consent from the parents or guardians, especially in non-pharmacological methods that may be viewed as invasive or that require active participation. (Stone et. al 2017.)

For the successful adoption of nonpharmacological pain management interventions, addressing these challenges is crucial in pediatric oncology. Overcoming these barriers may require the establishment and implementation of standardized policies and regulations, comprehensive and long-term training of healthcare providers, and efforts to increase awareness and reception of these methods among the patient population. Additionally, more research is vital to determine the effectiveness of these interventions in diverse cultural settings and to create better strategies for surpassing cultural limitations.

5.3 Effectiveness of non-pharmacological interventions

Different studies reviewed show the effectiveness of non-pharmacological interventions in pain management. A study by Birnie et al., found that interventions like hypnosis and CBT have improved coping skills and significantly reduced pain intensity. Patients reported both their ability to manage and significantly reduce pain. The positive results from using these psychological interventions bring out the potential to complement them with traditional pharmacological treatments. A mix of both non-pharmacological and pharmacological treatments would lead to an optimal overall pain management strategy for pediatric patients. (Birnie et al. 2013.)

According to Wren et al., physical intervention like massage therapy and acupuncture have led to improved quality of life with reduced pain scores. While long term effects of pain medication have been a huge concern when using pharmacological interventions, non-pharmacological interventions offer fewer side effects in the area of pain management. This is especially significant in pediatric oncology where long term effects of pain medication is a matter of concern. With the non-pharmacological interventions, reliance on medication is minimized and in turn, medication side effects are reduced. (Wren et al. 2019.)

Many caregivers prefer the incorporation of non-pharmacological interventions as these interventions mitigate the side effects of pain medications. Pediatric patients also appreciate and feel a sense of empowerment by participating in

different forms of therapy like music, art and other forms that allow them to actively participate in their own pain management. Active participation in this way, not only gives them a sense of empowerment, but also a sense of control in a situation where an illness can have an otherwise powerless effect on a patient. Involving the pediatric patients in their own care helps improve their psychological wellbeing. Caregivers and patients views are important in the effectiveness of non-pharmacological interventions. (Jibb et al. 2023.)

Non-pharmacological interventions can also be made more effective by integrating them into a pain management plan that includes both non-pharmacological and pharmacological methods. An integrative approach can allow for pain management solutions to be tailor made to every patient based on their unique requirements and needs. For instance, a mix of massage therapy or hypnosis with a low dose of pain medication may prove more effective than a single intervention on its own. The combination would address different aspects of pain, the emotional, psychological and physical aspects. (Jibb et al. 2015.)

For non-pharmacological interventions to succeed, health care practitioners need to be skilled and experienced in implementing them. Health care practitioners therefore need training and educational programs in implementing these interventions to ensure efficiency when implementing these interventions. Training and educational opportunities should be continuous as this helps health care practitioners to stay up to date on the latest research plus best practices in non-pharmacological pain management. Institutions need to invest in continuous training and education for their employees for quality assurance and to improve the outcomes of non-pharmacological interventions. (Alsaiari et al. 2024.)

5.4 Theoretical concepts and framework

The studies we have reviewed studies highlight some theoretical concepts that can be associated with non-pharmacological pain management. These are social learning theory, gate control theory, bio psychological model and self-regulation theory.

5.4.1 The social learning theory

According to the above theory, human beings learn behaviors by modelling, observations and imitation. When incorporating this theory into pain management, pediatric patients can learn coping mechanisms against pain from the guidance of a healthcare provider. Pediatric patients can also learn coping mechanisms by observing how their peers are able to cope and adapt the same strategies. Family group interventions or group therapy with other peers are examples of interventions that incorporate social learning theory. These interventions can be useful to pediatric oncology patients in learning pain coping mechanisms from peer, family or healthcare providers. (Stone et al. 2017.)

5.4.2 The gate control theory

In 1965 Melzack and Wall proposed that perceptions of pain could be influenced by psychological factors. In this theory, we have the “gate” which refers to the spinal cord. Different psychological factors which include cognitive or emotional can open or close the gate. In opening and closing of the gate affects how pain is transmitted to the brain. Interventions like music therapy, art therapy and CBT close the gate to pain signals sent to the brain. When the gate is closed the perception of pain is reduced. Better understanding of this theory in collaboration with the right non-pharmacological interventions can help healthcare providers effectively manage pain based on their patients needs. (Wren et al. 2019.)

5.4.3 The biopsychosocial model

The above model incorporates different strategies in dealing with pain involving the social, psychological and biological aspects. The model looks at pain in a deeper way, not just as a physical effect but holistically influenced by a patients social environment, cultural background and psychological state. The model works well with non-pharmacological interventions as many aspects of an individual or patient are dealt with. Cognitive and psychological aspects of pain are dealt with by incorporating CBT. Non-pharmacological interventions like

meditation and yoga take care of emotional and physical dimensions. Healthcare providers can tailor make different intervention for individual patients based on their specific needs. (Jibb et al. 2015.)

5.4.4 The self-regulation theory

The above theory proposes various behavioral and cognitive strategies as ways of regulating individual psychological and physiological responses to pain. In this theory, patients are taught to control their physiological functions such as relaxation of muscles, breathing techniques and heart rate regulation. This theory encourages active participation of the patient in their pain management which creates a sense of empowerment. (Kanitz et. al. 2013.)

The effectiveness of non-pharmacological interventions can also be enhanced by incorporating the above theoretical concepts in their implementation. Healthcare providers would be able to implement and treat pain better if they understand perceptions to pain and the mechanisms that contribute to pain. The theoretical frameworks in collaboration with non-pharmacological pain management create an avenue for further future research to hopefully lead to the improvement of pain management strategies especially in pediatric cancer patients.

5.5 Summary of key research findings

The key findings presented in the results section include the barriers to the implementation of nonpharmacological methods as well as the theories around the improvement of the application of these techniques. Some of the barriers include the nurses' knowledge for using the non-pharmacological techniques, barriers regarding implementation and cultural considerations. Also discussed is the effectiveness of the non-pharmacological techniques in dealing with pain management. Additionally, we reviewed four theoretical concepts and frameworks that can help both healthcare professionals, pediatric patients and their parents to enhance the effectiveness of non-pharmacological pain management strategies. The topics covered in the research findings are summarized in the mind map below (Figure 3).

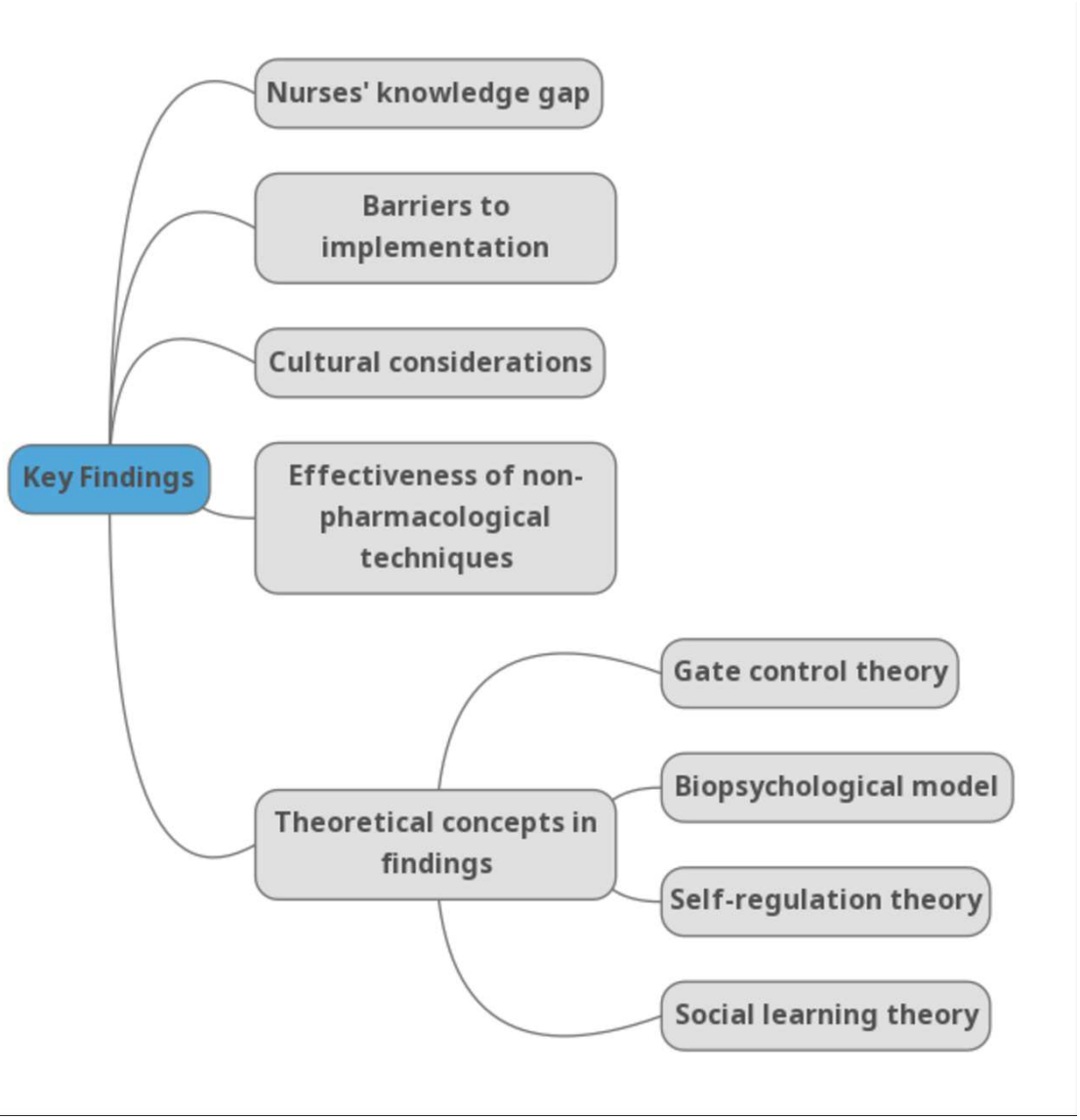

Figure 3. Mind map of key research findings

6 DISCUSSION

As research into non-pharmacological pain management continues to grow, several emerging trends are worth noting. The integration of technology, such as virtual reality (VR), offers new avenues for managing pain in pediatric cancer patients. VR, in particular, has shown promise in providing immersive distraction during painful procedures, thereby reducing pain and anxiety. By capturing the child’s attention in a virtual environment, VR veers off their focus from feeling the pain and towards the captivating stimuli that is in the virtual space. As shown in studies, VR can be most effective in decreasing procedural pain, for example

during chemotherapy or when changing dressings as immerses the child into the experience thus greatly reducing the perception of pain. (Teh et al. 2024.)

In the advancement of pain management techniques, the growing attention towards patient-centered care in healthcare is likely to accelerate further research into personalized approaches for patients. The use of personalized techniques involves considering individual preferences of the patients, their cultural beliefs, and unique medical regimens, leading to a more tailored approach. For instance, a patient's individual pain management plan might include the merging of pharmacological and non-pharmacological techniques based on their pain profile and previous treatment response. These considerations are an acknowledgement that no single technique is likely to be functional for all pediatric patients and that it is necessary to combine strategies to get optimal results in pain management. (Jibb et. al 2015.) Additionally, the implementation of more robust guidelines in clinical settings for non-pharmacological interventions will be crucial for their broader use. As available evidence grows, these policies can be updated in line with the latest developments and proven practices. As a result, non-pharmacological methods will be applied more consistently and accurately across different healthcare environments. (Birnie et al. 2013.)

6.1 Conclusion

(In summary,) this study has demonstrated that non-pharmacological methods, specifically technology interventions, physical interventions, music, art and play therapy, psychological and behavioral interventions are effective in reducing pain among pediatric cancer patients. The main findings of this research confirm that these techniques serve as therapies for pain when adequate training is given to healthcare providers, caregivers, and patients to alleviate misconceptions around cancer pain management. The objective of this study is therefore achieved, through the evidence presented in the findings and results.

The main accomplishment of this study is bridging the knowledge gap revolving around non-pharmacological methods and their effectiveness in the pain

management process of pediatric patients. It contributes to eradicating the belief that pharmacological methods are the only suitable alternatives in treating chronic pain, a major symptom in cancer. Additionally, this study sheds more light on home care methods and self-management interventions for children and adolescents in their cancer treatment journey. The findings presented aid in solving the problem that many caregivers face, which is not knowing how to relieve the pain of their young ones while at home, when medication alone is not effective.

The incorporation of these non-pharmacological techniques analyzed in this study have significant implications in helping to decrease opioid doses used in the treatment of children and adolescents suffering from this chronic disease. From the findings of this study, some of the physical interventions assessed, specifically acupuncture, may decrease withdrawal caused by opioids as well as decrease the dose and duration of opioid treatment. (Wren et al. 2019.) Another major implication is the effect that these therapies have on the pediatric cancer patients. Not only do these methods give some sense of control over their treatment journey, but also improve the personal resilience of these patients, leading to a holistic pain management process with combined effort from all parties involved. Additionally, this study is highly beneficial to healthcare providers by equipping them with knowledge on how to incorporate these evidence-based non-pharmacological ways. Through adequate training and practice, they can improve their treatment plan for this pediatric population as well as educate their patients on the application and efficacy of these techniques in relieving pain.

6.2 Ethics and reliability

The basic pillars of a good scientific study are reliability and honesty and these guide the conduct of research with ethical standards. Ethics, in the field of research, can be defined as being sensitive to others. The researcher is required to take into account ethical issues at each stage of the research process, i.e. from the idea and planning stage to the implementation stage until it is complete (Dobakhti, 2020). As our thesis is a descriptive literature review research and

does not involve any other participants like interviewers, the main ethical issue arising would involve plagiarism of other sources. The University of Applied Sciences is quite strict on this issue and should be adhered to when using others' work, one must acknowledge this. Based on this, we have acknowledged and referenced all sources we have used or quoted and therefore have adhered to ethical requirements.

Reliability in research ensures the quality of scientific activity in terms of methods, analyses, and use of resources (Dobakhti 2020). This thesis is guided by the good scientific practice of the research ethics advisory board. All sources utilized have been referenced according to the Xamk referencing guidelines and the Harvard model continually throughout the thesis process. The selection of material to use was planned and careful to make sure we used reliable articles. We used reliable search engines as recommended by the institution or research advisory.

6.3 Limitations of the study

Although this study provides valuable findings of non-pharmacological ways for pain management in pediatric cancer patients, some limitations should be considered. The findings of this study primarily rely on secondary data as it is a descriptive literature review therefore the lack of collection of firsthand data may limit a deeper and practical research into the topic. Additionally, the nature of this research is highly generalized because of obtaining findings from a range of sources therefore not putting into consideration specific settings such as low-income areas, and other societal or cultural factors.

6.4 Further research ideas and recommendations

Non-pharmacological pain management strategies offer a valuable complement to traditional pharmacological treatments for pediatric cancer patients. These interventions, ranging from music therapy and CBT to physical interventions and CAM, provide a holistic approach to pain management that addresses the multifaceted nature of pain. The effectiveness of these interventions is supported

by a growing body of evidence, highlighting their potential to improve the quality of life for pediatric cancer patients. However, the successful integration of these strategies into clinical practice requires overcoming significant barriers, including the need for standardized protocols, cultural considerations, and ethical concerns. Future research should continue to explore the potential of emerging technologies, personalized approaches, and the long-term impact of non-pharmacological interventions, to provide comprehensive and effective pain management for all pediatric cancer patients.

There is also a need for more research on the integration of non-pharmacological interventions into palliative care settings. As pediatric cancer patients near the end of life, managing pain becomes increasingly important. Non-pharmacological interventions can play a critical role in providing comfort and improving the quality of life for these patients, but more research is needed to determine the most effective strategies for this population. Another consideration for research is the practicability of techniques such as VR in the home setting and not just under supervision or in hospitals. This will improve self-management of cancer-pain for pediatric patients and create a feeling of independence in their care planning.

Additionally, the theoretical concepts and frameworks, i.e., the gate control theory, the biopsychosocial model, the self-regulation theory and the social theory, discussed in the last section of findings and results, also provides a basis for further research and development in the field of non-pharmacological pain management, contributing to the ongoing improvement of care for pediatric cancer patients. Another area, mentioned in our discussion above, for future research is the exploration of the long-term effects of non-pharmacological interventions on pain management in pediatric cancer patients. While many studies have demonstrated the short-term benefits of these interventions, there is still limited evidence of their long-term impact. (Wren et al. 2019.)

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Grammarly software was used in this thesis for grammar perfection. ChatGPT version 4 was also used for structuring of thoughts and piles of information. No data was cited directly from the AI tools, but rather verified information was obtained from databases and cited correctly both intext and in the list of

references. The AI was only used for structure and the authors rewrote in their own words and therefore take full responsibility for this work.

Appendix 1. Information search table

Database	Search terms and search phrases	Hits	Originally Included	Final articles included
PubMed	Nonpharmacological AND child* AND cancer pain	33	7	3
CINAHL	Cancer pain AND child	266	9	3
PubMed	pain management AND cancer AND children OR paed*	77	6	2
PubMed	Pain manag* AND cancer AND child* AND nurs*	198	3	2

Appendix 2. Research articles table

Article Title & Year of Publication	Author (s)	Objective	Method	Conclusion
Multidisciplinary Pain Management for Pediatric Patients with Acute and Chronic Pain: A Foundational Treatment Approach When Prescribing Opioids. 2019	Anava A. Wren, Alexandra C. Ross, Genevieve D'Souza, Christina Almgren, Amanda Feinstein, Amanda Marshall and Brenda Golianu.	Aims to give a general outline of a multidisciplinary approach for pain intervention for pediatric patients with chronic and acute pain. Additionally, the study points out the evidence and methods of action for the majorly used non-pharmacological techniques in this multidisciplinary integrative approach.	Systematic Review	The multidisciplinary approach has been shown to be effective in the alleviation of pain (both acute and chronic). It involves the integration on pharmacological methods and non-pharmacological techniques such as hypnosis, CBT, acupuncture and MBIs that have a long-term effect on the psychological state. Therefore, this approach is advised to be applied early in the treatment process of youth and pediatric patients with pain.
Psychological and Physical Interventions for the Management of Cancer-Related Pain in Pediatric and Young Adult Patients: An Integrative Review. 2015	Lindsay A. Jibb, Paul C. Nathan, Bonnie J. Stevens, Emily Seto, Joseph A. Cafazzo, Nisha Stephens, Liza Yohannes, and Jennifer N. Stinson.	To identify and evaluate the present evidence on how effective non-pharmacological pain interventions are for young adults and children with cancer.	Literature Review (N = 1,171) aged 1–21 years.	There are various nonpharmacological methods that greatly reduce the intensity of pain especially in procedures and thus are effective in pain treatment.
Nurses' knowledge, perceived barriers and practices regarding cancer pain management: A scoping review. 2024	Alsaiari, S., Alhofaian, A., & Tunsi, A.	To observe nurses' level of knowledge in the practice of pain management while also identifying barriers they encounter when caring for oncology patients.	A systematic review of 20 articles.	Findings highlighted the need for enhanced education intervention for nurses to optimally manage pain for oncology patients and give high quality care.
Psychological interventions for needle-related procedural pain and distress in children and adolescents. 2013	Birnie, K. A., Noel, M., Chambers, C. T., Uman, L. S., & Parker, J. A.	To evaluate the effectiveness of psychological interventions for procedural needle related distress and pain in children and adolescents.	59 trials with 5550 participants. Use of the following psychological interventions; hypnosis, combined CBT, distraction.	There was evidence of reduction of needle related distress and pain from the use of combined CBT, hypnosis and distraction.
Nurses′ knowledge	Mekonen, W. M., Muhye, A.	To evaluate nurses practices and	Study conducted on	To enhance nurse knowledge in neonatal pain management to training, refresher courses and

and practice about neonatal pain management in public hospitals in West Oromia, Ethiopia. 2022	B., & Gobeza, M. B.	knowledge of neonatal pain management and factors influencing them.	nurses. Questionnaire used for data collection & sampled through simple random sampling. 203 nurses.	providing access to reading material on neonatal pain management
A framework for capacity enhancement of Rwandan nurse educators and preceptors facilitating nursing students to learn paediatric pain management. 2024	Uwimana, P., Mukamana, D., Babenko-Mould, Y., & Adejumo, O.	To develop a framework that would provide a solution to the gaps in pain management education for nurses.	A qualitative study undertaken sing through multidisciplinary group discussions (academic nurses, nurse clinicians and student nurses).	An opportunity raised for the resolution of nursing pain education through the developed framework.
Psychological therapies for the management of chronic and recurrent pain in children and adolescents. 2018	Eccleston, C., Fisher, E., Law, E., Dudeney, J., Palermo, T., & Stewart, G.	Determine effects of psychological therapy on clinical outcomes of pain intensity in children compared with usual treatment. Also examine the impact of psychological therapy on anxiety and depression symptoms.	Randomised controlled trials comparing credible psychological treatments to an active treatment.	Mostly cognitive behavioural therapy was used, it was found that the therapies are effective in reducing pain intensity in children. No positive effect on depression and anxiety immediately after treatment.
Keeping the balance – an overview of mind–body therapies in pediatric oncology. 2013	Kanitz, J., Camus, M., & Seifert, G.	Mind body therapies used with pediatric oncology patients for pain management and to help them participate in their recovery.	A qualitative study for the clinicians of mind body therapies to summarize the study status in the field of pediatric oncology.	MBTs can enhance conventional medicine, motivating patients to participate in the recovery process and to promote self-regulation.
Social learning pathways in the relation between parental chronic pain and daily pain severity and functional impairment in adolescents with functional	Stone, L., Bruehl, S., Smith, A., Garber, J., & Walker, S.	Testing a model in which parental chronic pain predicted adolescent's daily average chronic pain severity via parental modelling of pain behaviours and parental reinforcement of	A 7 day pain diary used by 154 pediatric patients with functional abdominal chronic pain were kept to test the model.	Parental reinforcement and parental modeling, that is, social learning is one probable mechanism for the transmission of risk of chronic pain from parents to offspring.

abdominal pain. 2018		adolescents pain behaviours.		
Qxford Textbook of Palliative Nursing. 2019	Ferrell, B. R., & Paice, J. A.	Children in different growth stages express pain differently. Nurses need to know the patient in front of them to be able to evaluate and treat pain.	A review of on pediatric pain and how nurses should know the child in front of them. Emphasizing that nurses need to understand different age development stages of children and how they can assess their pain in different ways using different tools.	To enhance nurse knowledge in evaluating and assessing pain and using combined approaches, i.e. pharmacological and non-pharmacological to treat pain.

Appendix 3. Table of Content Analysis

Original data unit	Condensed version	Subcategories	Main category
"*The study provides a brief overview of a multidisciplinary pain management approach for pediatric patients with acute and chronic pain, highlight the mechanisms of action and evidence base of commonly utilized integrative non-pharmacological therapies in pediatric multidisciplinary pain management, and explore the opioid sparing effects of multidisciplinary treatment for pediatric pain. Integrative non-pharmacological interventions such as CBT, MBIs, hypnosis, and acupuncture target the cognitive-affective and physiologic components of the pain experience, and support the cultivation of coping tools that can lead to long-term improvements in pain, psychological functioning, and quality of life*".	Multimodal approaches of pain management for pediatric patients are advised to reduce the over dependency on opioids and to effectively treat chronic and acute pain	Acute and chronic pain in pediatric patients. Integrative non-pharmacological therapies. Treatment for pediatric pain.	Integrative non-pharmacological pain interventions
"*Several modalities significantly decreased pain intensity, suggesting that these strategies may be effective methods of pain treatment, particularly in the case of painful medical procedures. In particular, seven studies examining the impact of hypnosis on procedural pain showed a positive impact. Touch-based therapy and youth distraction also were effective in decreasing pain. To maximize quality of life for pediatric and young adult patients with cancer, all appropriate pain management modalities should be incorporated into practice*".	Interventions like active distraction, massage, tough and hypnosis were proven to be effective in relieving pain for children and young adults with cancer. They are therefore advised as psychological and physical methods.	Distraction therapy, e.g. VR Physical methods e.g. touch and massage Hypnosis as a psychological method	Psychological and Physical Interventions.
"*The study examines nurses' level of knowledge and practice in pain management and identifies the barriers they encounter when caring for patients with cancer. Findings highlighted the need for enhanced education intervention for nurses to optimally manage pain for oncology patients and give high quality care*".	In the study nurses' knowledge, perceived barriers and practices regarding cancer pain management are evaluated.	Nurses' knowledge and practice. Barriers to implementation of non-pharmacological pain management interventions. Neonatal pain management.	Nurses' knowledge in pain management

"*The aim is to assess the efficacy of psychological interventions for needle related procedural pain and distress in children and adolescents. There was evidence of reduction of needle related pain and distress from the use of combined CBT, hypnosis and distraction*".	Psychological interventions such as combined CBT, hypnosis and distraction are vital for reducing procedural pain in children.	Reducing pain in needle procedures through combined modalities. Psychological interventions for pain management (combined cognitive behavioral therapy, hypnosis).	Psychological interventions.
"*Evaluates nurses' practices and knowledge of neonatal pain management and factors influencing them. Enhances nurse knowledge in neonatal pain management to training, refresher courses and providing access to reading material on neonatal pain management*".	How nurses' knowledge on neonatal pain management can be improved and its importance.	Nurses' knowledge and practice. Neonatal pain management.	Nurses' knowledge in pain management.
"*Study undertaken sing a qualitative approach using multidisciplinary group discussions (academic nurses, nurse clinicians and student nurses). To develop a framework that would provide a solution to the gaps in nursing pain management education. The developed framework provided an opportunity to resolve the gaps in nursing pain education*".	Responding to gaps in nursing pain education by capacity enhancement of Rwandan nurse educators and preceptors facilitating nursing students to learn pediatric pain management.	Nursing students. Teaching or learning pediatric pain management skills.	Nurses' skill in pain management.
"*This study examines the efficacy of psychological therapies on pain intensity compared to treatment as usual. The study also checks on the effectiveness on psychological therapies on dealing with depression and anxiety symptoms versus treatment as usual*".	Effect of psychological therapies on pain intensity and on depression and anxiety from the pain compared to treatment as usual.	Psychological therapies for pain management.	Psychological therapies.
"*The study looks at the field of Mind Body therapies especially in relation to the pediatric oncology field. The study looks at the most used techniques and their efficacy*".	Mind Body therapy techniques used in pediatric oncology and their effectiveness.	Mind body therapies like hypnosis, massage, relaxation techniques used to in pediatric oncology pain.	Mind body therapies.
"*Testing a model in which parental chronic pain predicted adolescent's daily average chronic pain severity via parental modelling of pain behaviours and parental reinforcement of adolescent's pain behaviours*".	A 7 day pain diary used by 154 pediatric patients with functional abdominal chronic pain were kept to test the model which parental chronic pain predicted the adolescent's chronic pain.	Pain encountered by adolescent's based on social learning from parental chronic pain.	Pain encountered based on social learning.
"*In the book is a chapter (64) on pediatric pain and knowing the child in front of you. It emphasizes that nurses need to understand different age development stages of children and how they can assess their pain in different ways using different tools. They also talks about taking a*	Understanding how to evaluate pain in different ages & to manage it using both pharmacological and non-pharmacological approaches.	Evaluation of pain in pediatrics. Pain management. Nurses knowledge.	Nurses' skill in pain management.

combined approach of pharmacological and non-pharmacological pain management".			