MUSIC THERAPY IN CHILDREN WITH CANCER

Music therapy to alleviate perception of pain and improve mood in children with cancer during the diagnosis phase

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ABSTRACT

In this study around a music therapy intervention in a hospital context, where I analyzed changes in subjective pain and mood in four children with a recent diagnosis of cancer who received treatment of music therapy.

The study has been based on a quantitative methodology, using a design with an experimental group, with pre-post measures. The music therapy intervention consisted in 5-6 individual sessions into their hospital´s room doing a improvisational music-therapy.

Data from subjective perception of pain and mood were registered previous and post music therapy intervention. The subjective pain was measured with the Wong-Baker scale (1997), and the mood state with EVEA scale (Sanz, 2001). The pre-post tests were completed by children, their families and main nurses. For the analysis of dates has been used statistical measurements, like as mean, variance, and, St deviation and significant result with Paired Sample T-Test-.

Results showed positive trend in both variables analyzed. So, Children showed a decreased of subjective pain, decreased in anger, fear and sad moods, and increased happiness mood, comparing their scores, previous and after music-therapy intervention. Results of family ´s scores confirmed the children results, although it could be observed differences into them. And, finally, It could be showed the comparation of subjective scores of children in pain and mood with subjective scores of main nurses. There were differences between both.

Although more research is needed, the results of this study suggest that music therapy is an effective tool to improve the quality of life of these children in this situation.

Keywords: children, cancer, hospital, quasi-experimental design, play, improvisational music therapy

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I. INTRODUCTION

"Each of us has the potential to become his/her real self" **Carl Rogers**

1.1 Motivation

During my music therapy internship in the framework of the Master's Degree in Music Therapy at Vitoria-Gasteiz (IMAP), I worked with children with a cancer diagnosis at the paediatric ward of the Hospital Universitario Central de Asturias (HUCA), in Oviedo (Spain).

In those sessions I used several music therapy techniques, mainly clinical improvisation techniques, following Wigram's model (2005), defined by him as "musical improvisation with a specific therapeutic meaning and purpose in an environment that promotes response and interaction". This way I offered them a way to communicate other than verbal communication, where they did not have to tell me anything they would rather not tell me but, at the same time we could connect through musical interaction with the instruments. During these sessions, I was surprised by the changes in the children when they interacted with the music and the instruments, their facial expressions would reflect relief, and the message "I don't want to stop". In addition, a deep link was created between us so that we would understand each other just by looking at each other's eyes. A space of trust was created, where children knew that music therapy was for them, that they had control over the session. Moreover, this empowerment of controlling the session, which is so necessary in that environment where they had no decision making capacity, made it easier for them to show their feelings freely. The music therapy session was a space for play, a space to be together as equals.

Clinical improvisation is also the music therapy I am most interested in. Among other changes, I identified a greater willingness to play and enjoyment, enhanced communication with their parents, positive mood changes and a better

acceptance of the hospital environment and the stress resulting from their disease and the special conditions of hospitalisation.

Starting from “right here, right now”, children are children and they behave as such when they are playing, whether in hospital or not. I have seen how children forget medical treatments and procedures, even something as simple as taking their temperature. Most times children, whenever possible depending on the type of intervention, focus on music, on the instruments and the sessions move forward as usual.

When parents came in at the end of the sessions they had the facial expression of a normal family. I felt they needed to feel like that, like a normal family. As music therapist I felt that the parents needed to feel like a normal family. Often you could hear the kind of comments of what is typically considered a normal life, or life out of hospital, for instance things related to school, their relationship with friends or their siblings at home. I noticed other kind of changes in them as well, at the beginning of the sessions I could see fear and anguish in their eyes and, at the end I could see and feel how those feelings disappeared and they also focused on the “right here, right now”, on realising that their child was feeling better and that was passed on from children to parents, if the parents saw that their children were feeling better, they also felt better.

I have seen that “normal family” image several times in my career and I believe it is essential to bring some normality to their lives at those times.

Furthermore, clinical improvisation is the music therapy technique I feel most comfortable with, I do not know for sure whether this is because I am a musician, but it certainly is where I can better connect and where I have experienced that I can connect with “the other”, where I feel that all that exists is music and feelings and souls, both the patient's and mine and a musical discourse is created freely and at ease.

All of this has motivated me to continue working in this area of intervention. I currently work as music therapist in the Paediatric Oncology Branch, with children

from 0 to 18 years of age. My work there is related with an association of families with children with cancer, and is integrated in the psychology area of this association.

1.1.1 My work in the hospital

My current work as music therapist in the hospital focuses on paediatric cancer patients. In particular through the Asociación Galbán, Association of Families with Children with Cancer in the Principality of Asturias, Spain.

All children admitted to the Unit are offered music therapy. When the nurses from the ward let me know that there is a new case I speak with the doctors that care for the child in question. Then, I speak with the child and the family about music therapy and we have a first introduction interview. During this first interview we get to know each other, I explain what music therapy is and answer any questions that might arise concerning the therapy and how it is carried out in the Branch.
Once they agree to take part and sign a prior informed consent, we can have the first session.

The sessions are always in the children's rooms, so I go to each room carrying the instruments with me.
These first sessions are aimed at introducing the therapy and include: Exploration of instruments, short improvisations and insight of their sound history.

With children that are already familiar with the therapy my modus operandi is as follows. When I start my shift my first contact is with the nurses to find out which children are in the ward and how they are. They provide the first assessment. Then, I go to the children's rooms and we jointly organise the sessions.

Hospital sessions usually include a good deal of spontaneous improvised play, many times with the toys they have in sight. Other times, it is clinical improvisation with almost no spoken language. In other cases, I use musical stories, it depends on what the child prefers, i.e., whether the child feels more like music, playing, using objects and toys or whether he/she feels like making up new stories. These

stories include many situations taken from their lives before the disease, such as things they would do before, friends school friends, etc. In some cases, they are specially interested in learning how to play a given song. This may be because they are music students or because they identify themselves very much with a particular song, which in turn may be because that song is very popular among their friends. Children who already have a cell phone keep daily contact with their friends through social networks and, the possibility to learn a song that is currently popular can help them feel important, active and with something to share (apart from their disease) with their friends. It might be a good way to feel “normal” in their group of friends.

1.2 Problem formulation

Thus, my interest in this study was how 5-6 sessions of active music therapy can affect the subjective pain and mood of 4 children between 2 and 9 years of age, hospitalised in oncology diagnostic phase, by comparing the scores obtained in these aspects before and after the music therapy treatment, with a quantitative approach in a quasi-experimental design.

1.2.1 Method and methodology

I have chosen a quantitative methodology for this study. The quantitative methodology is based on answering a question based on objective data. This methodology is widely recognised in the medical field and its results are clear and understandable for the reader. This methodology is based on what can be observed, manipulated and verified (Cuenya & Ruetti, 2010).

The method used for this quasi-experimentation has been a pre and post design in a single group of children hospitalised in the Paediatric Oncology Unit of the Hospital Universitario Central de Asturias (HUCA), in Oviedo, Spain, that received music therapy sessions.

To this end, **before and after the MT intervention** several data regarding **subjective pain and mood** were registered. These data, collected by me as music therapist, where completed with registers from the parent's subjective assessment of the mood and also with the assessment by the nurses.
4 children eventually took part in this study, with ages between 2 and 9, out of a total of 18 children that received music during 2018 within the framework of the Music Therapy Programme offered by Asociación Galbán, an association of families with children with cancer in the Principality of Asturias, Spain.
Both the study and the MT intervention have been carried out with prior informed consent by the participating families, and with the approval by the Ethics Committee of the Hospital.

The **music therapy intervention** consisted of a cycle of between 5 and 6 individual active MT sessions that took place in the child's room.

MT sessions were between 20 and 30 minutes long and consisted mainly of free improvisation play using instruments such as piano, guitar and small percussion: Maracas, tambourines or shakers.

The **data collection assessment tools** used before and after the MT treatment were: Scale for Mood Assessment (EVEA), (Sanz, 2001) and Wong-Baker Visual Analog Scale for pain (1997)

A quantitative analysis has been performed upon collection of these data, comparing the direct scores obtained by each child regarding subjective pain and mood.

On the one hand, the scores of each child before and after the intervention with MT have been compared.
Then, a comparative assessment of each child's data before and after the intervention has been performed including the subjective assessment by parents in the parameter of **mood.** This comparison includes as well the subjective assessment by the nurse in charge.

On the other hand, regarding the variable of **pain,** only the data from the children have been compared, before and after the MT treatment. This has been done at individual level with each child and at group level.

1.3 Influences of music therapy

My influences, sources of inspiration and the theories that I follow as a therapist are Carl Rogers' person-centered approach, and Abraham Maslow's humanist philosophy.

Carl Rogers, in his work, “The process of becoming a person” (2000), explains that his purpose in the relationship with the patient is understanding how the patient feels in his/her inner world, accepting him/her the way he/she is and creating an atmosphere of freedom where the patient can express without hindrance his/her thoughts, feelings and the way he/she is, thanks to the confidence and freedom offered by the therapeutic relationship. Applying this to the context of this study means offering these children a space of confidence and trust where they should feel at ease to express themselves freely within the hospital environment.

This line is also followed by the humanist psychologist **Abraham Maslow**. His theory is based on two fundamental aspects: Our needs and our experiences, in other words, what motivates us and what we search for throughout our lives, and what happens to us along this path. This is how our personality is shaped.

According to him we not only need vitamins and minerals to keep healthy, but other aspects as well, such as life experiences and the exercise of ethical values which are necessary to update and develop our inner nature, cultivating it. (Maslow, 2016) Thus, in the hospital environment of the children, they not only need treatment for the disease, but they have as well psychological and emotional needs.

In line with all the foregoing, **Mark Ettenberger**, defends a biopsychosocial model. He considers that individuals are multi-dimensional beings in a constant dynamic process of relationships that tend to keep their inner balance in spite of the external factors of their environment.

"The satisfaction of the need for self-esteem results in feelings of self-confidence, self-worth, strength, capacity and sufficiency to be useful and necessary in the world" A. Maslow (1975)

1.4 Children's play

I think it is important and interesting to discuss children's play, as it is from play, in this case music games, how children, starting from a space of confidence can release their inner reality.
According to **Winnicott's** "Reality and play" (1971) play has a universal nature. This means that, potentially, playing is a realisation of the experience of "being and doing", bearing in mind that the "being" is what makes "doing" possible and, as long as "doing" is allowed, "being" is also allowed.

The question of playing that appears in early stages is kept throughout life as this capability goes together with creative living and the true self. This is because it develops imagination, creativity and the relationship with others. Playing is associated with the passage from dependence to independence. Therefore, it has diagnostic value: Distinguishing between those who are capable of playing and those who are not. This means that play is a means and end in itself as long as not being able to play indicates experiences like a trauma that has stopped the ability to feel alive, authentic and real. In Winnicott's view playing is closely related to creativity.

Creativity leads to the experience of authenticity by the true self, that enables the individuals to live without losing their singularity, before the world that precedes them and where they belong. Creativity is, therefore, the "doing" that comes from

the “being”. According to Winnicott (1971), creativity refers to a capability related to health that allows for the personal contribution that each individual can make.

Winnicott (1971) understands the analysis of the therapy as an area that must be located in exact times and spaces for the patient to be able to have the experience of surprising himself/herself. For this purpose, the analysis must be an overlap of spaces where two subjects play.

Winnicot (1971) states that play is natural and universal, and a “basic way of life”. He believes that all children have the capability to play, and that what is right for children is playing. He understands play is central to the emotional life of children and it is an indicator of mental health.

In order for a child to play, for this inherited potential to develop, good enough environmental conditions must exist and confidence is essential. This confidence is acquired in the first relationship with the mother, i.e., in the relationship with the environment that the mother sets at the beginning, and then it is extended so that it is no more reduced to the mother as it includes other people.

Carl Rogers also mentions play in his work “The process of becoming a person”, (2011) and describes it as the ability to play spontaneously with ideas, colours, shapes and relationships, trying new combinations of elements and turning what has been given into a problem. This play and this free exploration generate intuition and a new perspective. Applied to the children included in this study, playing spontaneously can bring them a vision of their situation and of this environment, helping them feel more comfortable.

Another experience that usually goes together with creativity is the desire to communicate. (Rogers, 2000). Children need to express emotionally the feelings that they have in this difficult situation and, by means of spontaneous play, in this case, musical games, that come from the innate creativity we all have, they can fulfil this need. In addition, in the case of music therapy, this can be done without using words, it rather flows through musical improvisation. To this end, as I have already said, certain conditions of confidence and psychological freedom (unconditional acceptance of the individual, not judging and empathising).

1.5 Needs of hospitalised children

At Niklaus Children Hospital several needs of hospitalised children are pointed out, as well as their most commons fears and concerns (Nicklaus Children´s Hospital)

Their most important need is play, as it helps them master their environment. They use play to understand and solve fears and as a mode of expression. They also mention the need to control the situation and to keep their independence, to discuss their feelings and to do things right, being recognised for doing so.

Furthermore, they also mention the concerns and fears related to hospitalisation, such as: Fear of treatments, of losing control and independence, of changes that their body may undergo, embarrasement in front of the medical team, fear of their privacy being violated and fear of death and disability.

In a hospital environment, in particular in an oncology setting, it is usually useful to approach the child using intermediary objects, such as puppets, stuffed toys, etc. that will voice some aspects of the experience that the patient may be undergoing (that contributes to the therapeutic bond, as it makes the child feel understood). These objects will ask children about their experience in hospital so far (a good way to elicit information), and they will talk about life in hospital and about treatment (a good way to give information) (Pitillas Salvá, 2012).

The possibility to have a space for expression where there is no need to be concerned about adults reacting or feeling bad, which goes beyond feeling bad physically, may mean a very significant change for the patient. The therapist office, the playroom of the hospital, the patient's room may become a safe place, a space of unconditional acceptance (Pitillas Salvá, 2012)

The overwhelming nature of cancer disease cannot be faced only from reality. Paradoxically, the illusion brought about by play is what enables the integration of reality. By playing, children can move forward or move back, come closer or get away from the intense core. These exploratory moves allow children to contain and control the experience. (Sourkes, 1995).

In summary, children use play to enter into action, replacing inhibited experience with the joy experienced when playing. They express with a fantasy image their real live experiences. When playing all rigidity goes away and things are done through expression and creativity in an imaginary world created by themselves, that nevertheless shows traits of their real image and life experience.

"When playing, and only when playing, can children and adults create and use their entire personality, and individuals discover their identity only when they show themselves as creators" (Winnicott, 1971).

1.6 Clinical Improvisation in music therapy

Music therapy is the professional use of music and its elements as an intervention in medical, educational and daily-life environments with individuals, groups, families or communities with the aim of optimizing their quality of life and improving their health and physical, social, communicative, emotional, intellectual and spiritual well-being. Research, practice, education and clinical training on music therapy are based on professional standards according to cultural, social and political contexts. (WFMT, 2011).

Moreover, the National Cancer Institute, of the US National Health Institutes (2018), refers to music therapy as a type of treatment that uses music to improve the general health and well-being of a person. It may include music creation, singing, moving, listening or relaxing. Music therapy alleviates the tension, pain, anxiety and depression caused by a disease such as cancer and its treatment. Music therapy is a type of complementary medicine.

Music therapy uses active techniques, such as: clinic improvisation or song-writing; and receptive techniques, such as: guided image and music, sound envelopes, etc…

Among active techniques, I emphasize clinic improvisation as it is the one I have used in this study, following **Wigram's** model**.**

Wigram, in his book “Improvisation: methods, and techniques for Music Therapy Clinicians, Educators and Students” (2005) explains his approach to patients before starting the music therapy intervention with them: *“I use music in a structured and non-structured way by means of improvisation, alternating between a directive and non-directive approach depending on what suits better the specific needs of the client. I also believe in a flexible approach, accepting that all sounds are within a therapeutic context, without necessarily using a musical framework that structures the client too much”.*

Wigram emphasizes the importance of giving positive feedback and support to patients after their improvisations. To this end, he states that the role of the music therapist is to create a musical structure where the client can operate and develop a relationship with the therapist in order to jointly gain insight in the inner life of the client. In other words, according to Rogers the therapeutic relationship should create an environment that gives the children confidence and a feeling of safety so that they can express themselves freely feeling the support of the music therapist in the improvisations. Wigram (2005) adds that connecting with people through music has to do with understanding the feeling of the contact with them through the music they are creating, but it also has to do with the union of a musical experience, and with giving them your own music and musical personality.

1.7 Relationship of the aforementioned theories: Humanist Philosophy, play and clinical improvisation

Combining the theories of play, humanist philosophy and T. Wigram's clinical improvisation there are several points in common as we can take therapeutic play to music and clinical improvisation:

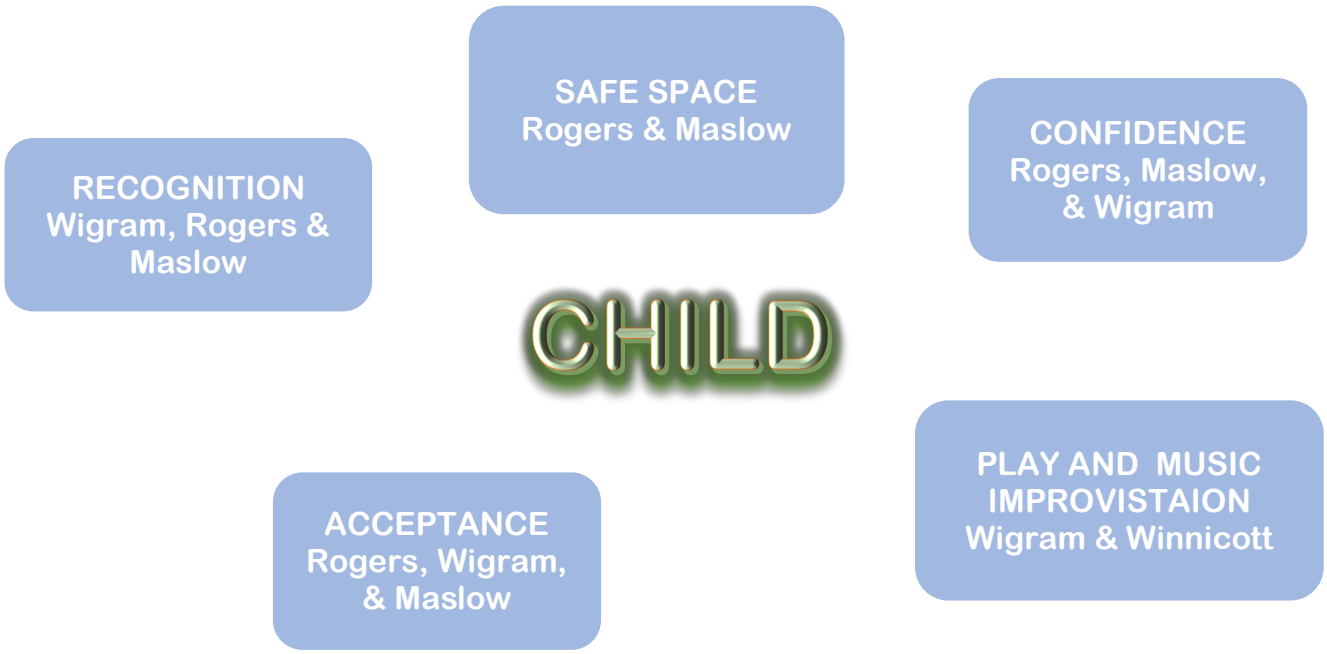
- The first one is the base, which is the relationship of confidence that must be established, of unconditional acceptance as Carl Rogers (2000) puts it,

to create a space where children feel comfortable. In the relationship established between the child and the therapist, the therapist can help the child express feelings. Moreover, Maslow (1975), in his pyramid of needs emphasizes feeling safe and supported as one of the most important need. In addition, Wigram (2005) points out the importance of giving the patient positive recognition during the improvisations.

- Once the relationship of confidence has been established and the safe space has been created, we can start with the music game or improvisation. Quite often children do not find words to describe their feelings or thoughts, in contrast, thanks to play, in this case, using the instruments and the clinical improvisation, they can develop skills to express their feelings.

- This music game combines the following aspects: Spontaneous free flow, always creative (Winnicott, 1971) and, in the case of this study, using musical improvisation as the core technique of the therapy (Wigram), 2005.

- Focusing always on the children, and taking the likes and preferences as starting point to start or continue developing the path towards the development of their potential (Maslow, 2016)



II LITERATURE REVIEW

In this chapter, I will address the literature relevant to responding to my research question: how can musical therapy help alleviate pain for four children with cancer and improve their mood during the diagnostic phase of their disease? There is hardly any published literature regarding child cancer and improvisation, which is why I have taken into consideration the following topics: cancer, music therapy in the medical field, children and adults, improvisation as a technique used in musical therapy, and the parameters of pain, and mood.

2.1 Child Cancer

Child cancer is a grave illness which is very rare during childhood and marks a before and after in the lives of the child and their family members. This disease is curable in more than 75% of cases in developed countries and requires a very complex, multidisciplinary infrastructure for its diagnosis and treatment (López Ibor, B., 2009).

In general, cancer and the consequent treatments are considered a stressful and traumatic experience for both the children and their families due to the numerous, potentially stressful situations which they must confront over the duration of the disease: the threat to their lives or physical integrity, invasive and painful medical procedures, serious side effects from the treatments, physical and functional changes, frequent hospitalizations, changes to their daily routine and family dynamic in addition to changes to their social and academic situations (Bragado, 2009).

In Spain, approximately 75% of the children diagnosed with cancer recover. The most common types of cancer that children are diagnosed with are leukemia, lymphoma, and other hematologic pathologies. Those types of cancer, which together account for 30% of all child cancer cases, are followed by brain tumors,

renal tumors, and osseous tumors**.** Therefore, interest in studying cancer's long-term effects and treatment is constantly increasing, regarding the physical effects as well as effects on patients' personality and their maturation process (López Ibor, B., 2009).

According to the most recent report by RETI-SEHOP (the Spanish Registry of Children's Tumors), in 2016, 1078 cases of child cancer were recorded in children from 0 to 19 years old. Specifically, in the HUCA, the Central University Hospital of Asturias where the study was carried out, an average of 25 new cases are recorded annually. The need for specialization in childhood and adolescent oncology has grown, and over time research about oncological processes and advances in this field have increased the survival rate to a 75% survival rate after five years according to RETI-SEHOP's report.

As a starting point, it is important to remember that our patient is a child. Assimilating the disease into his or her normal life and the lives of his or her family members is the best way to maintain some stability in a life interrupted by the cancer diagnosis. The objective of pediatric oncology has evolved in recent decades from curing a child "at any cost" to working towards the goal of a child or adolescent being cured of cancer and also developing into a healthy adult, not only physically, but also mentally, socially, and spiritually (López, Ibor, B. 2009). Reactions to the disease vary widely depending on different aspects such as the child's age, which phase of the process the child is in, how incapacitating the treatments are, etc. For this reason, it is essential to monitor each child individually and take into consideration all of the different factors in his or her individual case (Baquero e Ibáñez, 2009).

Childhood cancer can cause various emotional alterations such as stress, anxiety, and depression, which can make the illness even worse. Children often have unexpected reactions to their cancer including passivity, worry, anxiety, or rebelliousness, but on the other hand they sometimes have positive reactions such as acceptance and collaboration. It is also common to observe lonely behaviour or isolation since the disease might require long periods of

hospitalization which diminish social contact and relationships, above all those with peers (Grau, 2002 y López-Ibor, 2009).

Certain facts must be taken into account:

- Cancer does not affect only the patient, it also affects his or her parents, siblings, grandparents, friends, etc.
- Cancer is a circumstantial aspect of the child's life. The child continues to be a child, which means that he or she continues the maturation process, which should be affected as little as possible by the disease. Therefore, it is important to work to integrate the illness into the child's normal life, and thus the normal life of the child's family.

2.2 The Phase of Diagnosis and Treatment of Child Cancer

Hospitalization can be stressful and confusing for the child and his or her family. Children who are admitted to the oncology ward for the first time often feel disoriented, confused, and frightened (Dun, 1999). Their parents might feel incapable of giving their children the support that they need during such a challenging time (Robb, 2003).

When a child is admitted to the hospital, it is a difficult time for both the child and the family. It is possible that children with cancer might not be able to understand all of the situations they are confronted with, such as surgeries or hospital visits. In any case, their lives, daily routines, and family dynamics change suddenly and drastically and it is necessary for them to readjust in a way that might not be possible for them on their own. This means that music therapists must take special care to observe and understand each child in order to know how well the child comprehends the current situation. That is the only way they can offer support and tools to help the children adjust to and confront their new situation (Edwards & Kennelly, 2004).

Spending time in the hospital as a patient can be very bothersome for a child. This experience can have physiological and psychological influences, which can in turn affect both the physical and mental health of the hospitalized child: an increased heart rate, elevated blood pressure and decreased oxygen saturation can all be physiological responses to stressful experiences. An increase in anxiety and the perception of pain are psychological and physiological measurements that can also be affect by stress. Behavioural distress can be observed in behavioural changes related to eye contact, facial expression, verbal interaction, and participation. The patient will have higher or lower levels of distress, pain and mood depending on his or her ability to adapt to the situation, which will manifest themselves in his or her commitment to the treatment (Colwell, Edwards, Hernández & Brees, 2013).

During the initial phase of the disease (diagnosis, acceptance, and the start of the treatment), the child's necessities include decreasing anxiety and adjusting to the diagnosis and the hospital environment. The parents also need support for their own anxiety and strategies to help deal with their child's anxiety (Dileo, 2010

According to Jennifer W. Mack & Hokanbe E. Grier in her article "The Day One Talk" (2004), it is important to use the word "cancer" when giving families the diagnosis information to help them understand the seriousness of the situation and the treatment process and in order to augment their commitment. Considering that once they receive the diagnosis they will be in a state of shock in which they will not be able to retain information, using the word "cancer" might help them assimilate the information that they receive. It is very important that the family and the child work together as well as the medical team.

The American Academy of Pediatrics (1997) has said that recognizing a childhood cancer diagnosis causes distress; therefore, national organizations recommend that the families of childhood cancer patients are provided with psychological services at the time of the diagnosis (Noll & Kazak, 2004).
Once the treatment has begun, usually with the child and family's admission to the hospital, they find themselves in an unknown environment and one which they have very little control over. The hospital environment limits the child's

freedom to make decisions, daily activities, sleep schedule, meals, classes, visits, and medical treatment (Robb, 2003). The response to the hospitalization and treatment vary depending on the child's age. Very young children, who have just learned to walk, are developing their own autonomy, and do not understand the situation, can be very frustrated by the restrictions and limitations placed upon them in addition to becoming frightened of medical professionals. Preschool children may also become frightened by medical professionals and medical procedures, especially due to the fact that their verbal communication is still imprecise, and may become irritated. Children who are old enough to go to school may be worried by their physical appearance like hair loss and other side effects of the cancer and its treatments, miss their family, school friends, and their lives before their diagnosis (Hadley, 1996).

A survey about the most common symptoms for child cancer patients ages 10 to 18 carried out by the Memorial Scale of Evaluation of Symptoms (MSAS 10–18) found that children with cancer often feel very distraught because of the physical and psychological symptoms the disease causes. These symptoms include lack of energy, pain, and nausea. Complaints about the psychological symptoms stood out among the older children in the study, and the most distressing of these psychological symptoms were difficulty swallowing, mouth ulcers, pain and insomnia (Collins, Byrnes, Dunken, Lapin, Nadel, Polyak, Rapkin & Portenoy 2000).

The development of coping strategies is an important part of the adjustment when hospitalized for serious diseases such as cancer. Children that remain committed to and collaborative in undergoing their treatments and medical tests develop an active, flexible and positive way of facing their circumstances. Therefore, it is necessary for clinical interventions to promote an active and independent commitment for each patient (Dileo, 2010).

Malgorzata Monika Staoncyk (2014) mentions the strong impact that a cancer diagnosis has on the patient and his or her family in a review of Musical Therapy in support programs for cancer patients. Staoncyk notes the disruption for the patient and the patient's family on a social, physical and emotional level and the

negative emotional results such as anger, fear, sadness, guilt and shame. She contends that music therapy is part of many programs dedicated to supporting patients suffering from this illness and accompanies the medical treatment. She also emphasizes the benefits of musical therapy for patients with cancer, using active techniques for them such as improvisation or singing and receptive techniques like listening to music or guided meditation with music.
Staoncyk goes on to say that music therapy in cancer patients focuses on the need to express the disease as well as to alleviate the negative effects of the disease and treatments such as anxiety, nausea, stress, pain, mood and fatigue.
According to research, the results of music therapy are: improved mood, decreased stress, decreased pain and anxiety, and the development of relationships**.** Music therapy has been proven to be effective and should be included in rehabilitation programs in order to promote wellness, improve both physical and emotional health and quality of life. As she says, “music is the only art that can affect the spiritual, emotional, social, and physical health of human beings” (Staoncyk, 2014).

During the diagnostic phase, the child has to undergo many changes in his or her lifestyle in an unfamiliar place where he or she has little control of the situation and can make few decisions. The first phase, which consists of accepting the diagnosis, can be the most stressful that the child cancer patient must undergo (Katz & Joy, 1984). Koocher (1986) emphasizes the importance that psychological support begins in this first chapter and continues throughout the treatment.

2.3 Pain and Mood for Children with Cancer

Children receiving cancer treatment can experience a wide range of symptoms that often occur simultaneously (Chen & Tseng, 2008). Frobisher, Ellison, Reulen, Winter, Taylor, Stiller, Lancashire, Tudor, Baggott & Hawkins, (2009) in their systematic review of multiple symptoms, indicated that the ten most common symptoms found in their new studies were weight loss or gain, throat

pain, lack of energy, alopecia, drowsiness, bruises, facial bloating, pain, and anorexia. Fatigue and gastrointestinal symptoms were also found amongst the most common symptoms in the studies reviewed (Baggott et al., 2009). The symptoms can vary depending on the etiology, type of cancer, procedures or treatment, the side effects of the treatment and the secondary psychological effects (Yeh, Chiang, Chien, Lin, Yang, & Chuang, 2008). Hedstrom, Haglund, Skolin, & von Essen (2003) reported that anxiety, painful medical procedures, fear of pain, and social and physical isolation were the principal components that contributed to the aggravation of symptoms in children ages 0-19.

In child oncology (starting at the moment of diagnosis), more psychological reactions have been proven to occur in the initial stages of the diseases. These are related to the crisis caused by the diagnosis, the beginning of treatment and the side effects of the treatment (Matziou, Perdikaris, Galanis, Dousis & Tzoumaka, 2008).
Pediatric cancer affects its victims with afflictions such as depression in addition to the physical effects (Dodd, Janson, Facione, Faucett, Froelicher & Humphreys, 2001).

Pain in children with cancer is the symptom that has appeared most frequently in literature about pediatric cancer (Hockenberry & Hooke, 2007). Pain is a symptom defined by the physical, psychological and emotional experience of the individual (Enskar, Ljusegren, Berglund, Eaton, Harding, Mokoena & Moleki, 2007). Pain is an extremely prevalent symptom as well as the most terrifying part of child hospitalization and the aspect which provokes the most anxiety for children with cancer (Enskar et al., 2007; Jacob, McCarthy, Sambuco, & Hockenberry, 2008). The physical, psychological and emotional consequences of pain manifest themselves through the child's functioning, behaviour and adjustment (Varni, Burwinkle & Katz, 2004; Woodgate & Degner, 2003). The pain that children experience may disrupt their sleep habits as well as generate emotional distress in both the short and long term.

2.4 Music Therapy in Pediatric Oncology

Music therapy is a type of therapy in which the bond that forms between the child and the therapist, as well as the child's own development, can grow quickly through musical interactions with children and their families in the hospital environment. Once this relationship has begun, the therapist can help the child and his or her family and help with family problems as well. The music therapist uses musical improvisation, listening to music, composition of music, stories told by songs, songwriting and any other type of musical interaction initiated by the child to support and achieve positive changes in the child's mood, psychological state, perceived pain and social interaction with others (Bradt 2013; Edwards 2005; Edwards & Kennelly 2004). The music therapist works with the child and his or her family at the bedside, in a special treatment room or in a group setting depending on the child and family's needs (Edwards & Kennelly 2004).

Bruscia (2013) adheres to the following definition: "music therapy in medicine is all of the applications of music or music therapy in which the focus is on helping the patient improve, restore or maintain his or her physical health. This includes all of the focuses on medical treatment itself in addition to psychological factors. When the focus is biomedical, the objectives concentrate on the physical condition of the patient. On the other hand, when the focus is psychosocial, the objectives attempt to modify mental, emotional, social and spiritual factors that are involved in the medical problem or provide psychosocial support during the illness, treatment or convalescence."

Music therapy provides the hospitalized child the support to meet treatment objectives of the whole team, both medical and social. Children can be especially receptive to musical therapy due to their natural affinity for playing and interaction. Furthermore, a review of the research demonstrates that music therapy is very positive for children with cancer because "it facilitates their adaptation to their new reality, increases their self-esteem and sense of control of the situation, facilitates the communication and improves their immune

system's response to the disease thanks to the emotional support that the music provides" (Jorda, 2008).
When providing music therapy for pain management, it is important to remember that children in pain are often very anxious and unable to distinguish the pain from the anxiety (Edwards, 2005). Therefore, it is important to take into account and address the stress, anxiety and problems associated with pain when children complain of pain or need assistance during potentially painful medical procedures such as receiving injections or changing dressings for wounds (Edwards, 2005).

Music therapy for cancer patients can be applied to satisfy their needs during the diagnostic phase as well as during treatment and can be employed for groups of patients or individually. Music therapy's principal goals are to promote relaxation for patients, alleviate discomfort, reduce pain and balance out some of the symptoms related to treatment. Musical therapy offers opportunities for self - expression and provides positive experiences (Stanczyk, 2011**).**

In the initial phase of the disease, musical therapy has an important role and much that it can provide to the child. It can offer opportunities for self-expression, information analysis (mental clarity), anxiety reduction, decisions and control, and the creation of a safe, familiar space. In this phase, the music therapist evaluates the patient individually in order to determine the following music therapy treatment plan: he or she evaluates the pain levels, musical preferences and musical background of the patient (Tucquet &Leung, 2014).

2.4.1 Music in Medicine and Music Therapy in Medicine

Cheryl Dileo (1991) distinguishes between music therapy in medicine and music in medicine according to whether or not there is a therapeutic relationship between the patient and the therapist. According to this definition, music therapy implies a therapeutic relationship, a qualified musical therapist, and a relationship that is developed through the music and therapy process. This includes all different types of musical experiences: receptive, improvisational, recreational, compositional, or activities in which various arts are combined.

In my opinion, it is very important to emphasize the role of the music therapist in the process and highlight the therapeutic relationship that is created using music as a tool since this is an essential factor in affecting change in the patient.

Many professionals in pediatric medicine offer medicine to diminish pain, not just music therapy. Studies show that music which is played in the background or via headphones help children reduce their pain (Klassen, Liang, Tjosvold, Klassen, & Hartling, 2008). Some studies distinguish between music provided by a music therapist and music provided by another type of professional, such as a nurse, who provides the music using headphones (Klassen, et. al, 2008). Although this is not a distinction that is used in the literature about music therapy, it can be useful in order to find ways to differentiate between the work done by music therapists and the use of music by other professionals in the hospital environment (Bernatzky, 2013).

One critique of the use of music by professionals who are not music therapists is that the music is used to distract the child from his or her pain. Music therapists have used this conceptualization of the use of music by Bradt as follows: “distraction implies a swift diversion that can easily be interrupted by another distraction: when the sense of hearing is used to control pain, it is important the child’s attention to the music can be sustained.”
If the painful experience is relatively brief, such as a needle tap, music can help maintain a child’s attention and slow his or her breathing in order to reduce anxiety. When the painful experience is more extensive due to a longer procedure or the presence of chronic pain, the music therapist must pay close attention to the child’s ability to maintain his or her attention with music. This is where the use of live music provided by the therapist has its greatest potential. The ability of a music therapist to control and modify musical parameters including tempo, volume and accompaniment permit flexibility in the administration of music as a source of support during the treatment.

Although many music therapists have described how live music provided by therapists during painful procedures can offer comfort and support (Edwards & Kennelly, 2004), there is also a growing number of music therapists successfully

using the technique of creating music as a treatment plan to alleviate pain (Bradt, 2013).

2.5 Recent Scientific Reviews

I have grouped the articles that I am going to cite according to the parameters which their studies were based upon, which were pain and mood.

The majority of the quantitative research is based on work with pain, anxiety, depression, stress and emotional support, including the ability of music therapy to improve motivation (Barry, O´Callaghan & Wheeler, 2010; Nguyen, Nilson, Hellstrom & Bengtson, 2014; O´Callaghan, Baron, Barry & Dun, 2011).

* Children with cancer respond and react to their treatments and their hospital environments in different ways and intensities, some of them experiencing pain and anxiety. Nguyen, Nilson, Hellstrom & Benftson (2014), found that music can help to reduce those symptoms. Their objective was to study whether or not music influences the level of pain and anxiety in children who must undergo a spinal tap, one of the most painful procedures. 40 children ages 7 to 12 were divided into groups of equal size to participate in this study. Measures of pain, heartbeat, blood pressure, respiratory rate and oxygen saturation before, during and after the procedure. The children were also interviewed with open-ended questions in accordance with the completed procedure. The results showed lower levels of anxiety, slower heartbeat and slower breathing in the group which listened to music during and after the procedure. The levels of anxiety were also lesser in this group before and after the spinal tap. In addition, the interview results confirmed that these children had a more positive experience and that suffered from less pain and fear.
The pain was measured with a numeric rating scale (NRT) and the anxiety was measured with the State-trait Anxiety Inventory (STAI).
The musical intervention consisted of the children listening to music ten minutes before the procedure began on an Iphone while the control group also had

headphones but without music. The music was chosen by the children based on their musical background and their positive associations or memories linked to it.

* Colwell, Edwards, Hernández & Bres (2013), studied the impact of music therapy interventions (listening to music, composition, the Orff approach) in physiological and psychosocial habits amongst hospitalized children. The purpose of the study was to compare the effects of three music therapy strategies (listening to music, composing music and active participation based on the Orff approach) on the physiological measurements (heart rate, arterial pressure, oxygen saturation and pain) and psychosocial measurements (anxiety) of the hospitalized children (N = 32, 27 boys and 15 girls of 6 to 17 years of age). The study was designed and carried out in collaboration with pediatric nurses and music therapists. Both pain and anxiety were reduced significantly ($p = .01$).
The patients participated in a session of listening to music from a CD loaded onto an iPod, a session of composing music using a computer, or a session of music therapy based on the methods of Orff. Each session had a general theme, “All About Me,” in an attempt to help each patient focus on themselves as a person and not as a patient. The aim of these music therapy interventions was for the patients to concentrate on themselves as individuals and to provide opportunities for emotional expression, social interaction, decisions and decision making, and verbal processing of creative options. All of these sessions, both before and after treatment, were individual.
The lead investigator and the collaborating therapists employed a physiological measurement, the WACK-Baker Scale of Pain, and a psychosocial measurement, the State-trait Anxiety Inventory for Children (STAIC).

* Standley & Whipple (2003) carried out a meta-analysis of various studies about the effectiveness of music therapy in pediatric environments. The twenty-nine studies that they analyzed were divided into the following three categories: non-invasive procedures, minimally invasive procedures and invasive procedures. They found that the patients who had to undergo invasive procedures and non-invasive procedures benefited more from music therapy than those who had to undergo minimally invasive procedures. They also found that live, improvised

music was more beneficial than previously recorded music for all of the participants in the study. This is due to the fact that a therapist can adapt the music as the situation evolves. Finally, the patients who were actively participating in the music along with the therapists showed more positive results than those who only listened to the music passively.

* Bradt (2010) carried out a study to evaluate the effects of music therapy in the form of “music entrainment” (this technique of music therapy is based on the profound work related to pain in which the patient recognizes and accepts his or her pain and works to control and alleviate it) for post-surgery pain and emotional state in children and adolescents. 32 children between the ages of 8 and 18 participated in this study. The children were chosen randomly to participate in the four different sequences of the treatment**.** Each child participated in two sessions of music therapy and one session of routine care during two consecutive days starting 24 hours after surgery. These sessions of music entrainment were conducted for them individually in hospital rooms and led by the same music therapist. Each session lasted 30 to 45 minutes and utilized a wide variety of instruments. Pain was measured by a visual analogue scale (VSA).
A self-evaluation about the emotional state of the child was developed by the music therapist. The results showed a significant decrease in pain in the children when they participated in music therapy sessions compared to when they participated in routine care sessions. Furthermore, the children exhibited an improvement in emotional state: happiness, peace, relaxation, comfort and calm**.** In addition, there is a strong relationship between the ratings of emotional state and the intensity of the pain. With the two music therapy sessions, there was a strong association between improved state of mind and the decrease in pain compared to the routine care session. The authors note two main limitations in this study: one was the small number of participants and the other was the fact that only children undergoing the same type of procedure participated.

*A meta-analysis about the use of music therapy for pain, including malignant pain, that involved 51 studies (1867 exposed to music and 1796 controls) concluded that “listening to music reduces the intensity of the pain and the

necessity for opioids," but the magnitude of these benefits is small, and therefore, its clinical significance remains unclear (Cepeda, Carr, Lau & Álvarez, 2006). Mood and emotions can affect the intensity of pain that a person suffers and studies have shown that the perception of pain is reduced when the person distances himself from the pain (Igawa-Silva W, Wu S & Harrigan R, 2007). Music therapy can help alleviate the pain people experience due to cancer by helping them relax and by facilitating communication so that they can share their fears and feelings, which can help these patients relax even further. Some studies suggest that the longer the therapy lasts, the greater benefit it can have (Silva, Wu S & Harrigan R, 2007).

* Berggren (2018) considers that amongst the primary objectives of music therapy is working on being present in "the here and now." The conditions for many hospitalized patients change quickly, which means that music therapists in this environment should constantly evaluate their patients and adapt the objectives that they are working on to match their patients' current state of mind. Another important objective is to focus on "non-pharmaceutical pain management," which means reducing the patient's pain or perception of pain without prescribing medication. Furthermore, it is fundamental to develop the ability to deal with the situation, which can be related to the general hospital environment or with a specific aspect of the illness which is being treated.

* Hendon & Bohon (2007) carried out a study that explored the effects of play and music therapy on hospitalized children's mood. Sixty hospitalized patients in a pediatric trauma hospital, ranging in age from 13 months to 12 years old, participated in this study. Half of the patients were assigned a session of music therapy and the other half were assigned a play therapy session. They could play alone or with a volunteer and the play therapy space had activities such as reading, arts and crafts, imaginative play, puzzles, Legos and clay available. Meanwhile, the music therapy session consisted of the selection of an instrument (maracas, drums, bells or gourds) and the music therapist played the guitar to facilitate the playing of songs from the child's musical background. The results of the study supported the hypothesis of the researcher: music therapy had a greater effect on mood than play therapy.

The relationship between music and mood has been a topic of interest for researchers and therapists for a long time (Stratton & Zalanowski, 1991). Cassileth, Vickers & Magill (2003) studied the effect of music therapy on adults hospitalized for a transplant of autologous mother cells. Using the Profile of Mood States (POMS), the researchers suggested a 28% reduction in anxiety and depression according to patients' self-evaluation and a 37% reduction in general mood alteration in patients who participated in music therapy. Similar results were found using the Inventory of Mood, a valid instrument related to POMS and the Self-evaluation Depression Scale (SDS) (Nakayama, Kikuta & Takeda, 2009). The researchers demonstrated that music therapy reduced the rates of anxiety and depression in patients with cancer in the hospice environment.

* Amanda L. Verstegen & Michael J. Silverman (2016) performed a pilot study with the goal of determining if a single session of music therapy with live music chosen by the patient (patient-preferred live music, PPLM) could improve the mood of patients with BMT (blood marrow transplantation). The adult participants (N = 13) were randomly assigned to a music therapy group or a control group and completed the same questionnaires before and after the session. Although none of the results were significant, there were positive results in the music therapy session regarding their pain level and whether they were relaxed or anxious, alert or drowsy and happy or depressed in the experimental group.
The Quick Mood Scale (QMS), which is a psychometric derivative of the principles of POMS, was used to measure mood (Woodruffe-Peacock, Turnbull, 1998). A Numeric Scale of Pain Measurement 1-10 was used to measure pain (1 as the lowest amount of pain and 10 as the highest). The music therapy session consisted of a conversation between the music therapist and the patient about his or her music preferences. Then, the choice of music was based on the participant's responses to the therapist's questions about music preferences. The music therapist provided the accompaniment with an acoustic guitar.

* The purpose of a study by Lorissa Letwin & Michael J. Silverman (2016) was to determine if a program of two consecutive days of resilience focused music therapy (RFMT) would affect the resilience of adults in a medical/hematology

oncology unit. The participants (N + 15) were randomly assigned to RFMT or a standard support session. The quantitative results indicated that there was no difference between the groups in the evaluation prior to the sessions. However, the experimental group tended to have slightly more favorable scores in the categories of resilience and pain in the post-therapy evaluations than the control group. The thematic analysis of patient feedback during the interviews indicated that music therapy tended to (a) improve the therapeutic relationship, (b) emphasize positive perceptions of music, (c) provide positive distraction and improve mood and (d) improve strength and internal hope. Although the quantitative results were not significant, the results of the interviews after the intervention provide initial support for the protocol.

The researchers utilized the Response to Stressful Experiences Scale (RSES) (Johnson et al., 2011) to measure the resilience reported by participants. Each item on the evaluation was measured by a scale of five points beginning at 0 (not at all like me) to 4 (exactly like me). The researchers also measured pain using a Likert Scale of 10 points ranging from 1 (no pain) to 10 (the maximum amount of pain).

To better understand how the music therapist could have influenced the patient's resilience, the researchers interviewed individuals who had received two sessions of music therapy on consecutive days in a semi-structured interview format. The interviews took place after the second treatment session and consisted of four open-ended questions.

The protocol consisted of a two-day session. Throughout the first day, the IP discussed the types of music the patients were interested in and later moved on to PPLM with the topic of resilience and gave the patients the chance to choose songs from a list. On the second day, the session focused on PPLM based on resilience and a conversation about resilience based on the patient's responses. After the session, the IP observed the response of the patient to the music and later moved on to the next dialogue focused on resilience.

* The study carried out by Dóro, Neto & Cunha, (2017) in which live music therapy was applied with the purpose of diminishing social isolation caused by the allogeneic transplant of hematopoietic mother cells (alo-HSCT).

The adult patients (n = 100) were randomly selected, 50 participants were allocated to the experimental music therapy group (EMG) and 50 to the control group (CG) which received the standard treatment. The evaluation and quantification were performed using the Visual Analogue Scale (VAS). The dependent variables were pain, and mood of patients. The Mann-Whitney test ($p < 0,05$) applied was considered statistically significant when the two groups were compared, with the most significant improvement being that of patient mood (EMG).

The music therapy intervention consisted of using live music through music therapy techniques provided by a qualified music therapist, interpreting popular songs that form part of the social, musical and cultural identity of the patient. The researchers said that the live music has an incredible power to energize the patients and provide more of an emotional impact. Furthermore, the human presence of the music therapist makes the patients feel welcome.

* **Clinical improvisation,** a technique which was used in this study, has multiple benefits for the patient, which are: improved communication and self-expression, a sense of control of the situation and improved mood.

Wigram (2005), defines clinical improvisation as “the use of musical improvisation in an environment of trust and support to meet the needs of the clients.” This can be done in different ways: mirroring, imitation, support, solo, accompaniment. In clinical practice, music therapists try to equilibrate the use of musical elements with accents, volume and tempo, which can provoke or lower excitement (Bonde, 2009).

There is scarcely any literature about the use of improvisation for children in a medical context, especially in the form of quantitative research. Patkulaki, MacDonald & Flowers, (2012) aimed to explore the psychological process which is involved in an improvisation program of adult music therapy for cancer patients. 9 patients participated in this study and in the interviews at the end of it. The Interpretative Phenomenological Analysis (IPA) was used as a theoretical and methodological framework to analyze the interviews.

The results showed a series of benefits which the patients described in the interviews as emotional support, increased social interaction, an increase in self-esteem, relaxation, positive feelings, stress relief, a feeling of connection to the music and an improved ability to communicate.
This music therapy program had Nordoff and Robbins as its focus and lasted 6 weeks with two 60-minute sessions each week.

The sessions included: free improvisation or improvisation focused on a specific theme, or a more structured format. They were directed by a qualified music therapist and a psychologist from the Glasgow hospital where the study was conducted.

2.6 FINAL REFLECTION

After a review of the literature about the effects of music therapy interventions for children, adolescents and adults with cancer, my interest in continuing to study the impact this intervention can have upon variables such as mood and anxiety has grown.

These are the variables which have been studied the most and that can contribute to finding further support to justify using active music therapy in the pediatric hospital environment. Additionally, the most frequently utilized techniques have been active ones, principally musical play and improvisation. Other techniques mentioned in the research are song creation and the playing of well-known songs as a method of working on different issues related to the disease, coping with the disease, and the emotional state of the patient.

In my case, I will focus on the following variables: pain and mood in four children with cancer during the diagnostic phase of the illness. For this purpose, I will utilize the technique of clinical improvisation by way of play. For all four children, this will be their first experience with music therapy.

The technique of clinical improvisation and musical play and therapy are the areas with which I feel most confident. In my experience as a music therapist, these are the techniques that I have used the most. Furthermore, sometimes children do not want to speak, they only want to be distracted, play music and forget or play and forget, especially when it is their first contact with this type of therapy because it is a subtle but certain way of forming a bond and creating a safe space so that they may express themselves going forward.

III. METHOD AND METHODOLOGY

This third chapter deals with the methodology design used in this study, the framework chosen and how it has been carried out, as well as the method used for data collection and analysis.

Following the question posed, I have tried to answer how music therapy can affect and, in particular, alleviate the pain and improve the mood of 4 children with cancer during the diagnostic phase.

A quantitative methodology has been used to answer this question.

To this end a quasi-experimental situation was proposed, with a pre and post treatment design, with a group of 4 children without control group. 4 children between 2 and 9 years of age with a new diagnosis of cancer took part in this study. They all received between 5 and 6 sessions of music therapy in the hospital.

The assessment tools used before and after this intervention with music therapy where adapted rating scales for subjective assessment of pain and mood.

This study has been carried out with the express consent of the hospital and the participating families. It was approved by the Ethics and Research Committee on 1-03-2017, Study number 59/17.

3.1 Positivist paradigm

According to Ricoy (2006) “the positivist paradigm is defined as quantitative, empirical-analytical, rationalistic, systematic-managerial and scientific-

technological". Therefore, the positivist paradigm shall be the base for any research aimed at verifying a hypothesis by statistical means or defining the parameters of a specific variable numerically. (p. 14). In this case, the aim is to see how music therapy can alleviate pain and improve the mood of 4 children with cancer during the diagnostic phase, applying a quantitative design.

In this quantitative method, the scientific knowledge is rational, objective, based on what can be observed, manipulated and verified (Cuenya & Ruetti, 2010), such as the scales used to measure the parameters of pain and mood of these 4 children. Applying a positivist approach is about accepting knowledge deriving from the subject's experience, the empiricism. According to the principle of verifiability, only the statements whose existence can be verified through experience and observation are valid. All must be verified in order to be valid for science. In this paradigm experimentation has been the main way to generate formal theory (Hernández, Fernández & Baptista 2010)

According to positivism reality is absolute and can be fully grasped by humans; moreover, it is governed by natural laws and mechanisms. This paradigm can be used to determine the various factors associated with an object of study, be they causal, mediating or moderating (Field, 2009).

The findings based on this paradigm are real and generalisable to the entire population (Guba & Lincoln, 2002), however in the case of this study the sample population is very small.

Based on the positivist paradigm the answers to a research question are interesting as long as the phenomenon object of the study can be measured. From this perspective, the experimental methods that manipulate intentionally the independent variables at different levels of experimentation are considered valid. The hypothesis verification is based on the use of descriptive and inferential statistical methods such as the central trend measurements, dispersion, group comparison based on Student T, ANOVA, correlations, cause studies through linear regression, factorial analysis, assessment of explanatory methods using structural equations, among others (Field, 2009).

3.2 Quantitative research

For this study I have followed a quantitative methodology approach.
Quantitative research in the field of music therapy is based on the fundamentals the scientific method and experimental psychology. The generally accepted order of the scientific method is: a) Observing a phenomenon or identifying a question, b) describing the phenomenon or clarifying the problem, c) formulating a hypothesis, d) making predictions based on the hypothesis, e) verifying the predictions, f) modifying the hypothesis or predictions and verifying them again (if results are not consistent with the original observation), or g), accepting observations based on findings. (Wheeler, 2011)

The quantitative methodology approach consists of starting from a given idea and trying to find a prediction for it. In the case of this study, the aim is to show the effect on the 4 children selected receiving MT treatment, in particular in the aspects of pain and mood. MT is expected to make a change that can be observed, measured and compared with other similar changes in these factors or variables. The change expected is an improvement of the previous values of these aspects (pain and mood) towards more positive values and towards well-being.
To this end, a pre and post treatment design has been developed with self-informed test measurements.
This research methodology is suitable and recognised in the medical field due to the objectivity of its results.

I have chosen the quantitative research because it has a consistent structure (Creswell, 2014), its results are mostly based on data whose validity can be measured (Abbott 2016), and they are tried and tested, which is useful should another researcher wish to replicate this design in the future, or take it as a reference for any other project.

I agree with Creswell (2014) that this structure used in quantitative reports and studies has several advantages. It provides a framework that can help

researchers that are developing their skills. This structural consistency also helps readers understand more clearly what the researcher has analysed and shown with the results so that they can better assess the report.

Another advantage of the quantitative approach is that the results can be read and interpreted by professionals that are not music therapists, such as psychologists, sociologists or medical professionals, which facilitates the existence of different opinions and points of view about the same results when seen from different angles and professions, thus promoting teamwork and collaboration between different professionals. In the case of this study, that takes place in the health field, I think it is essential that it should be easily understood by medical professionals and that it should foster the acceptance of music therapy as a complementary tool to medical treatments and procedures.

3.3 Design

For this study I have chosen a quasi-experimental design with a selection of 4 children that received MT sessions in the Paediatric Oncology Branch.
They were requested to fill in several rating scales before the treatment and upon completion of the treatment they were asked to fill in the rating scales again.
Below there is a description of the process to select these children to take part in this study and of the assessment tools used.
The data analysed for this study were collected between January and September 2018 from 4 children with ages between 2 and 9, who received between 5 and 6 MT sessions in the context of a hospital admittance in the diagnostic phase of cancer with a pre and post quasi-experimental design.

3.3.1 Children selection. Inclusion and exclusion criteria

The hospital where the study has been performed diagnoses around 30 new cancer cases per year. The branch provides care to children and teenagers from

0 to 18, and they are all offered music therapy. Some children and teenagers receive from 1 to 6 MT sessions before they are discharged. In 2018 22 children received MT treatment.

Out of all these children, I decided to include in the study those who had a new cancer diagnosis, with ages from 2 to 9 and who had received between 5 and 6 MT sessions in a row. That means that from the beginning of the diagnostic phase until their discharge they had always been in the Oncology Branch.

As for exclusion criteria, I decided not to include in the study children that did not receive 5-6 MT sessions, under 2 years of age or over 14, or those cases where the MT sessions were attended by the parents.

The duration of the hospital stay of these children depends largely on the type of cancer. Children with leukaemia stay usually 6 weeks in hospital, as this is the duration of this first treatment cycle and medical procedures. Moreover, in the case of children with a cancer tumour, the duration of their stay in the Branch depends on the type of treatment. This may range from around one to three weeks.
In any case, they all receive an average of 2 MT sessions per week.

3.3.2 Data collection assessment tools

Data were collected and registered before and after the MT intervention from three different sources: The children, the parents and the nurse in charge of the child.
These data were collected by the music therapist, with the approval of the medical staff and the families.

- Children responded to the variables of pain and mood in the rating scales described below.

Parents were requested to respond to two rating scales of subjective assessment, one for the mood and the other one for the anxiety they observed in the child, before and after the treatment.
Nurses were as well invited to respond to a scale of assessment of the children's mood. In this case, the nurse that had to respond was the one that had been in contact with the child, although it was not always the same person before and after the treatment because of the different work shifts in the ward.

♦ Rating scales used with the children, regarding different variables, all applied before and after the treatment.

- **Pain.** **Wong-Baker's visual analogue scale** (1987) to assess **pain**. It consists of 5 faces with different facial expressions that show from joy to intense pain. It is assessed according to the face chosen by the child, where 0 indicates “no pain at all” and 5 “worst pain imaginable”.

- **Mood.** Ad hoc adaptation of **The mood Rating scale (Sanz, 2001), with the basic emotions of**: Joy, wrath, sadness, fear and calm. The child chooses a number from 0 to 10 that indicates his/her level in each of the 5 emotions, 0 being the lowest level, and 10 the highest.

♦ Rating scales used with parents to assess the mood of the child according to their perception.

• **The mood assessment scale used in this study was The Mood Rating Scale (EVEA, Sanz, 2001**). This scale is made up of several adjectives that assess four general types of mood, namely, depression, anxiety, hostility and joy. It is a situational scale designed to detect mood changes resulting from changes in the environment or context. In this scale, respondents must choose a number between 0 and 10, 0 being the lowest level, and 10 the highest.

♦ Rating scale used with nurses to assess children's mood and anxiety Nurses only responded to the scale for mood, **The mood Rating scale**, described above.

	CHILDREN DATA	FAMILY DATA	NURSES DATA
PAIN	Wong-Baker Scale		
MOOD	EVEA scale (adapted for children)	The mood Rating Scale (EVEA)	The mood Rating Scale (EVEA)

3.3.3 Data collection

In the case of the children and their families, the data were collected once they had accepted to take part in the study and before starting the MT treatment. They

were explained beforehand the procedure to respond to each scale. This was done in the room of the ward were only the child and his/her family were present. Likewise, upon completion of the MT treatment, they were requested to respond to the same rating scales again and this took place as well in the room of the ward were only the child and his/her family were present.

Moreover, the data collected from nurses were collected once the music therapist communicated the nurses that the child had accepted to take part in the study, therefore their responses should refer to the time that they had been in contact with the child until the exact moment in which they were informed of the child's participation. Likewise, when they were informed that the MT treatment was through, they were requested to respond to the said scale bearing in mind the current mood of the child.

3.3.4 Music therapy intervention

√ Individual sessions with the only presence of the music therapist and the child, and in the rooms of the oncology branch. The duration of sessions was around 30 minutes. Two session per week. The setting consisted of: Classical guitar, keyboard, tambourines, music bells, xylophone, maracas and shakers.

√ The techniques used were clinical improvisation active techniques following Wigram's proposals (2005): matching (coinciding, playing exactly what the child is doing at the same time), reflection (reflecting with music what we think is the mood of the child at that moment), taking on different roles: Soloist, follower and/or accompaniment, and in the same session the music therapist and the patient may take on several roles, thus fostering a proactive approach and/or the creation of empowering spaces. There might be situations where the child needed to gain confidence, so the child started by taking on the role of accompaniment or follower and the music therapist as soloist, and then, as the child would gain confidence, these roles could be switched and the child would be the soloist and the music therapist accompaniment or follower.

All sessions were scheduled in the afternoons in order not to interfere with doctor visits or any tests or procedures that children had to undergo. The **Structure** of these sessions was: Initial verbal greeting, musical game with the instruments and improvisations and closure.

• Greeting: We started with a verbal greeting followed by a short conversation where I asked the child how he/she was feeling that day.

The development of sessions was as follows: The 2 first sessions were devoted to getting to know, exploring and approaching the instruments, and then towards free instrumental improvisations.
During the play intervention, the aim was always to get the child actively involved during the session, using improvisation techniques. Different activities were used depending on the child's age. We could start directly with an improvisation where almost no verbal language was used in a fully musical session without pauses, or we could start from something that the child had at that moment, for instance a toy and include it in the music game, so that during the session the toy could play a more relevant role in the improvisations, or it could be sidelined as a "viewer" of what the child and the music therapist were playing. As the process moved forward and the relationship child-music therapist was further developed, there was less verbal language and more gestures, looks, smiles, in other words, communication became more empathetic, intuitive and musical.

• **Closure:** Upon completion of the session, there was a verbal farewell with the child as he/she would tidy up the setting and then, the music therapist would go out to meet the parents and to have a conversation with them and with the child to summarise what we had done during the session, and to schedule the following session bearing in mind any procedures that the child had in the mornings that could cause him/her adverse effects such as: Severe movement impairment, upset stomach or severe fatigue.

<table>
<tr><th>Before MT
Experimental design</th><th>MT Process</th><th>After MT
Experimental design</th></tr>
<tr><td rowspan="2">Pain test
Mood test</td><td>Structure of MT treatment:
-Introduction and first contact with the child
-Development of therapeutic relationship
-Closure of process</td><td rowspan="2">Pain test
Mood test</td></tr>
<tr><td>Structure of sessions:
-Starting with verbal greeting and conversation
-Establishing motivation and starting play and musical improvisation
-Farewell and closure of session with child
-Farewell and feedback in the presence of parents</td></tr>
</table>

The music therapist registered the evolution of sessions in a session record that, for the purposes of this study, would only be used for personal reflection.

3.3.5 Data analysis

The data collected before and after the MT have been analysed as follows:

1- All rating scales have been reviewed to find out the rating of each scale. This includes the scales responded by children, parents and nurses.

2.- The results of the different scales have been compared, pre and post and for each child, analysing the difference in the results. Likewise, the ratings obtained from parents and the corresponding nurses before and after the treatment have been compared.

3.- Then, the group results have been compared, comparing the average result of the group before and after the intervention, for each variable (pain and mood).

4.- Correlations have been established between the individual results based on data from the child compared with the ratings form parents and nurses with the purpose of comparing them and finding out if there is a correlation between what the child feels and what the parents and nurses perceive.

5.- Once the adjustment between children's outcomes and those of families and nurses were obtained, the next step was to calculate the St Deviation and whether or not there was a significant result using the Paired Sample T-Test, calculating the *p* and *t* values.

6.- Conclusions have been drawn based on these results, comparing them with other studies and analysing whether the hypothesis of the study has been confirmed.

PAIN

PAIN´S PERCEPTION FROM CHILDREN (INDIVIDUALLY AND GROUP)

MOOD

CHILDREN: THEIR MOOD´S PERCEPTION

FAMILY: THEIR PERCEPTION ABOUT CHILDREN MOOD´S (INDIVIDUALLY)

NURSE: THEIR PERCEPTION ABOUT CHILDREN MOOD´S (INDIVIDUALLY)

→ ADJUSTMENT BETWEEN FAMILY AND NURSES RESULTS, AND CHILDREN´S RESULTS RELATED TO CHILDREN´S MOOD

→ COMPARISON BETWEEN FAMILY´S PERCEPTION AND CHILDREN RESULTS RELATED TO CHILDREN´S MOOD

→ COMPARISON BETWEEN NURSE´S PERCEPTION AND CHILDREN RESULTS RELATED TO CHILDREN´S MOOD

→ GROUP CHILDREN RESULTS RELATED TO THEIR PERCEPTION OF THEIR MOOD

→ FAMILIES GROUP RESULTS RELATED TO CHILDREN´S MOOD

→ AVERAGE, ST DEVIATION AND PAIRED SAMPLE T-TEST RESULTS FROM FAMILIES RELATED TO CHILDREN´S MOOD

→ AVERAGE, ST DEVIATION AND PAIRED SAMPLE T-TEST RESULTS FROM NURSES RESULTS RELATED TO CHILDREN MOOD

The following chapter deals with the presentation and analysis of the data once, the data have been collected and analysed.

IV RESULTS

In this chapter I will present the results obtained in this study in the aspects of subjective pain and mood in four hospitalized children, in the preliminary phase of their cancer diagnosis.

The purpose of this study was to observe and analyze, the effect of 5-6 Music therapy sessions, on pain and mood of 4 children, who are in the diagnostic phase of cancer. I followed a quasi-experimental quantitative design and recorded measures (pain and mood) pre-post Music therapy treatment.

The children included in that study have been four, with an age range of 2 and a half years the youngest, and 9 the oldest of them. Two of them are boys and two girls.

The four subjects of the sample were diagnosed with childhood cancer and its severity varies from brain tumor to leukemia.
All received chemotherapy treatment. One of the children died during the course of the treatment.

Their time in the hospital was between three and six weeks, being able to receive six sessions of the proposed treatment of Music Therapy, and two of them five sessions. The relationship with the hospital and the nursing staff during his stay was always kind, collaborative with me during the process.

	Age	Diagnostic	Time at hospital	MT sessions
Child S.	7	Cerebral tumor	3 weeks	5
Child C.	6	leukemia	6 weeks	6
Child D.	2,5	Cerebral tumor	3 weeks	6
Child A.	9	leukemia	6 weeks	5

Table 1. *Description of the population of the study*

4.1 Description of individuals results

4.1.1 PAIN

The results in this pain variable have been obtained from the answers of the children in the Wong Baker scale, where 5 represents the maximum pain and 0 without pain. The children answered before, after and after the treatment of 5-6 sessions of music therapy.

The results indicated an important variation from the maximum of pain in A to 0 in C. When finished, after the treatment in all of them the pain score decreases.

	BEFORE MT	AFTER MT	DIFFERENCE
CHILD S.	2	1	-1
CHILD C.	0	0	0
CHILD D.	3	2	-1
CHILD A.	5	2	-3

Table 2. *Group results in pain*

No results were obtained from C. due to she didn´t feel any pain in the moment of assessing her pain, nor before MT, neither after it. She covered the scale but her results were 0 both before and after MT treatment.

4.1.1.1 Child S.

This child had a 2 out of 5 pain before Music Therapy treatment, and 1 out of 5 after it, so it could be said, that his pain decreased by a point about 5.

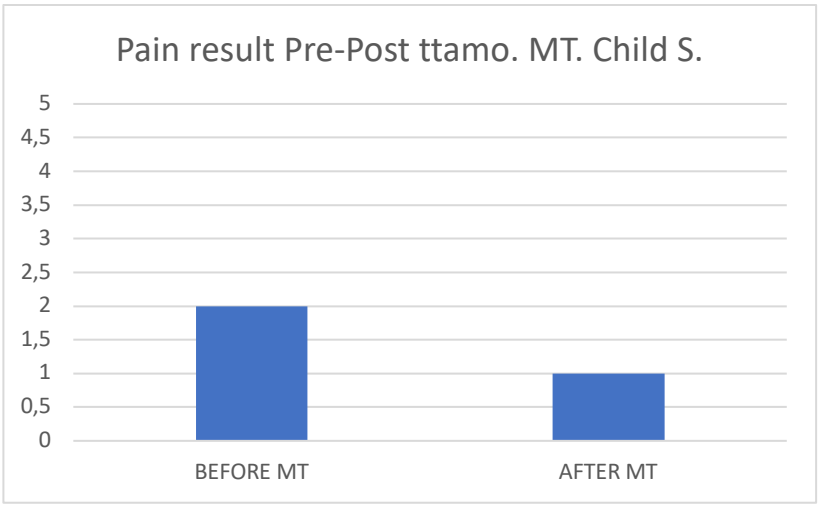


Figure 1. Pain *Results of S. Pre-Post MT intervention*

4.1.1.2 Child D.

He obtained a 3 out of 5 before Music therapy treatment, and a 2 out of 5 after it, so we can say that his perception of pain decreased one point out 5 after music therapy treatment.

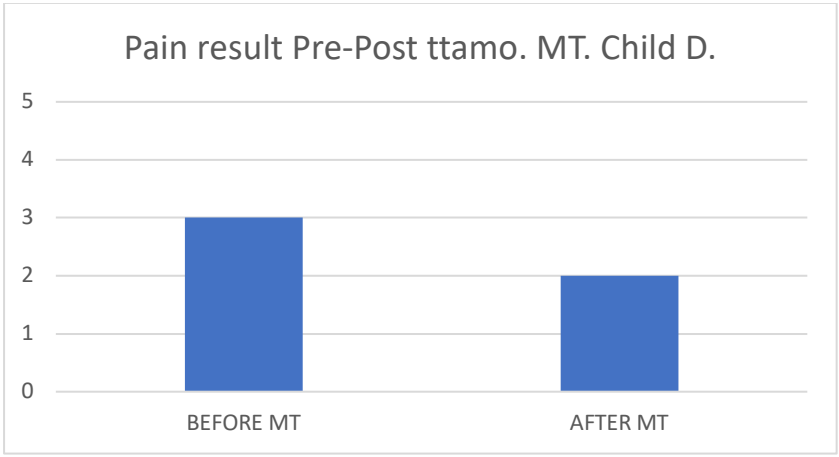


Figure 2. Pain *Results of D. Pre-Post MT intervention*

4.1.1.3 Child A.

The score for the pain of A. before music therapy was a 5 out of 5, and a 2 out of five after the treatment, so in this case, her perception of pain decreased considerably after Music therapy.

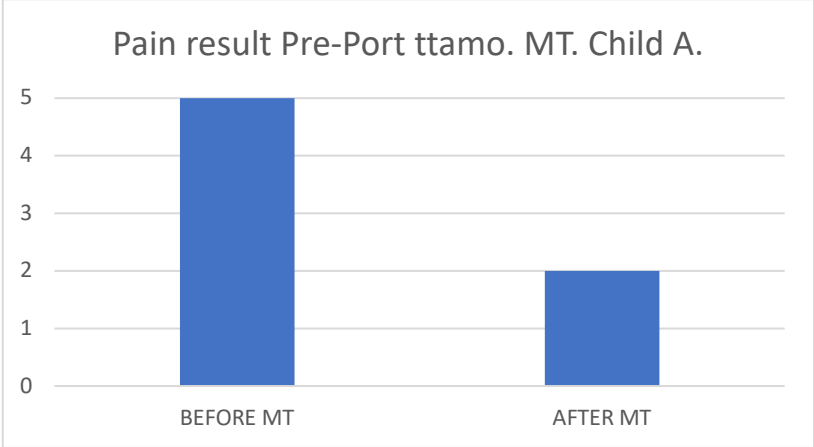


Figure 3. Pain *Results of A. Pre-Post MT intervention*

4.1.2 MOOD

The EVEA scale for mood was adapted ad hoc the music therapist for the children. This adaptation included the basic emotions: anger, sad, happiness and fear, with a score between 0 (the lowest score) and 10 (the highest score).

On the other hand, both families and nurses completed the entire scale with the 16 items. The intention that they covered the scale too was to confirm and compare their results with children results, appreciate the same parameter from different points of view, always focusing on the child

4.1.2.1 Child S.

	BEFORE MT	AFTER MT
Happiness	8	10
Sadness	2	0
Anger	1	0
Fear	1	0

Tabla 3. *Mood´s Results of S. Pre-Post MT intervention*

The results presented in the EVEA adapted mood scale for this child showed a high score in joy (8), and a low perception of sadness, anger and fear prior to music therapy treatment. These perceptions improved at the end of the treatment, obtaining a score of 10 in joy and 0 in the other variables.

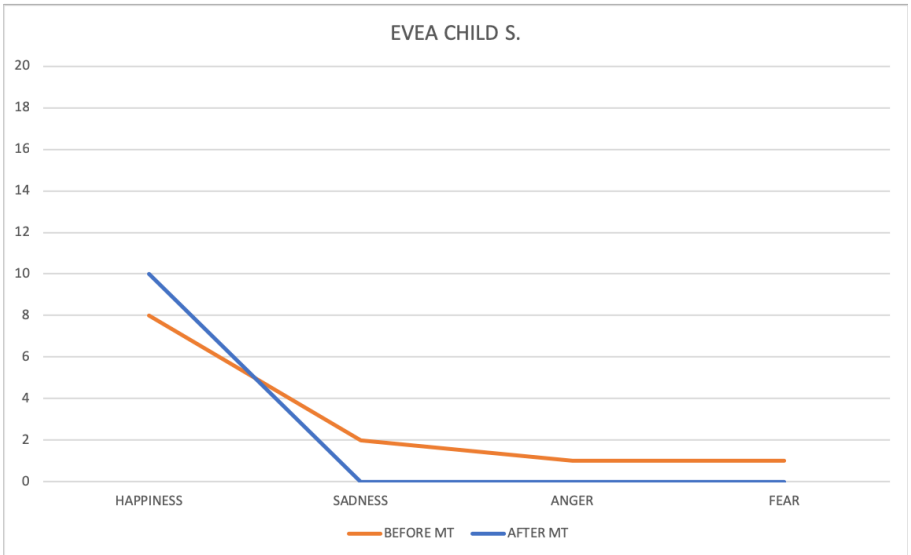


Figure 4. *Mood results of S. Pre-Post MT intervention with a score in the evea scale from 0 to 10*

Family´s child S.

Each child´s family covered this scale. The answers were according to their own perception of his son´s mood.

To calculate the results in this scale, the items were grouped in 4 categories. Happiness, Depression, Hostility and Anxiety. Both tests were equated following

an adjustment criterion where 40 on the scale of family and nurses equals 10 on the scale of children.

	BEFORE MT	AFTER MT
Happiness	18	29
Sadness-Depression	10	7
Anger-Hostility	8	4
Fear- Anxiety	7	6

Table 4. *Family´s mood results of S.*

Once analyze family´s results, both tests were equated following an adjustment criterion where 40 on the scale of family and nurses equaled 10 on the scale of children.

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSTMENT
Happiness	18	4.5	29	7.25
Sadness-Depression	10	2.5	7	1.75
Anger-Hostility	8	2	4	1
Fear- Anxiety	7	1.75	6	1.5

Table 5. Adjustment *of mood results between S. and his family, with a score of evea scale, used with parents (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between Child and Family´s perception**

	BEFORE MT		AFTER MT	
	Family	Child	Family	Child
Happiness	4.5	8	7.25	10
Sadness-Depression	2.5	2	1.75	0
Anger-Hostility	2	1	1	0
Fear- Anxiety	1.75	1	1.5	0

Table 6. *Comparison between S. results in mood and his family´s perception*

The results indicated that the perception of the mood of his son showed an improvement in their child´s mood; the anxiety decreased 0,25 point; Hostility

decreased 1 point; Depression decreased 0,75 points and happiness increased 2,75 points.

The adjustment between both results exibited that there are high coincidences in the results, in all the variables except “Happiness” before MT. This parameter was better valued by the children than by their parents.

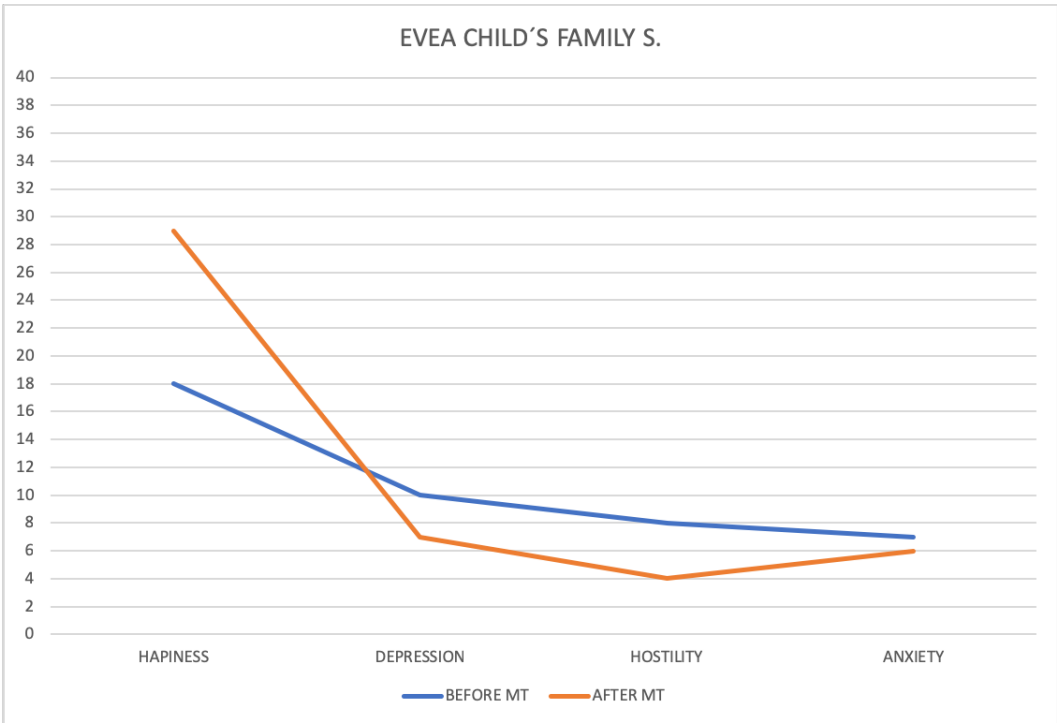


Figure 5. *Family´s mood results Pre-Post MT intervention in S case, with a score in the evea scale from 0 to 40*

Nurse. Child S.

The nurse who had kept in contact with each child was the person chosen to covered the EVEA scale. This was the same scale as the family. The answers, (as with families) were according to their own perception of the child´s mood.

I have to precise that, due to their work schedules, most of times, the test was not covered by the same nurse

	BEFORE MT	AFTER MT
Happiness	29	31
Sadness-Depression	18	0
Anger-Hostility	14	1
Fear-Anxiety	23	3

Table 7. *Mood results of Nurse related to S.*

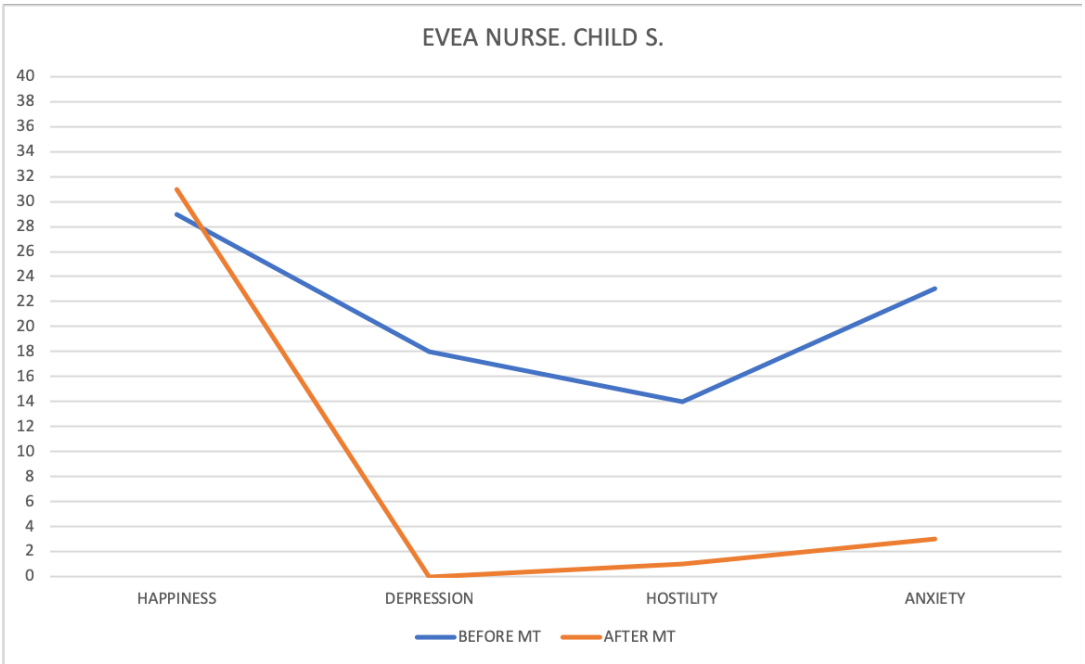


Figure 6. *Mood results of the nurse Pre-Spot MT intervention in S. case, with a score in evea scale from 0 to 40*

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSMENT
Happiness	29	7,25	31	7,75
Sadness-Depression	18	4,5	0	0
Anger-Hostility	14	3,5	1	0,25
Fear-Anxiety	23	5,75	3	0,75

Table 8. *Adjustment between S. and the nurse, with a score of evea scale, used with nurses (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between Child and Nurse´s perception**

	BEFORE MT		AFTER MT	
	NURSE	CHILD	NURSE	CHILD
Happiness	7,25	8	7,75	10
Sadness-Depression	4,5	2	0	0
Anger-Hostility	3,5	1	0,25	0
Fear-Anxiety	5,75	1	0,75	0

Table 9. *Comparison between S. results in mood and the nurse ´s* perception

The perception of the nurse related to S., presented Happiness is the most highly valued variable before music therapy and remains equally high after treatment, improving 0.25 points. Moreover, there was an important decline in Sadness-Depression, being 0 points after MT, and in Anger-Hostility descending 3 points to stay at 0.25 after music therapy decreasing after MT.

Apart from that, the adjustment of the results showed high coincidence between both opinions, except “Fear-Anxiety”, where nurse perceived higher levels of anxiety than the child.

- **Group results in S. case.**

	BEFORE MT			AFTER MT		
	Child	Family	Nurse	Child	Family	Nurse
Happiness	8	4.5	7,25	10	7.25	7,75
Sadness-Depression	2	2.5	4,5	0	1.75	0
Anger-Hostility	1	2	3,5	0	1	0,25
Fear-Anxiety	1	1.75	5,75	0	1.5	0,75

Table 10. *Group results in mood: S., his family and the nurse´s perception*

In conclusion, there were many similitudes in most of parameters between child, their parents, and the nurse, especially after MT.
Where we found differences was in “Happiness” where there was coincidence between child and nurse, but not between child and family; and “Fear-Anxiety”,

where there was coincidence between child and family, but no between nurse and child.

4.1.2.2 CHILD C.

	BEFORE MT	AFTER MT
Happiness	6	10
Sadness	4	2
Anger	3	1
Fear	3	1

Table 11. *Mood results in C. MT treatment*

It can be observed, that her perception of her mood was better after MT treatment. Her happiness increased 4 points, and her Sadness and her anger decreased 2 points.

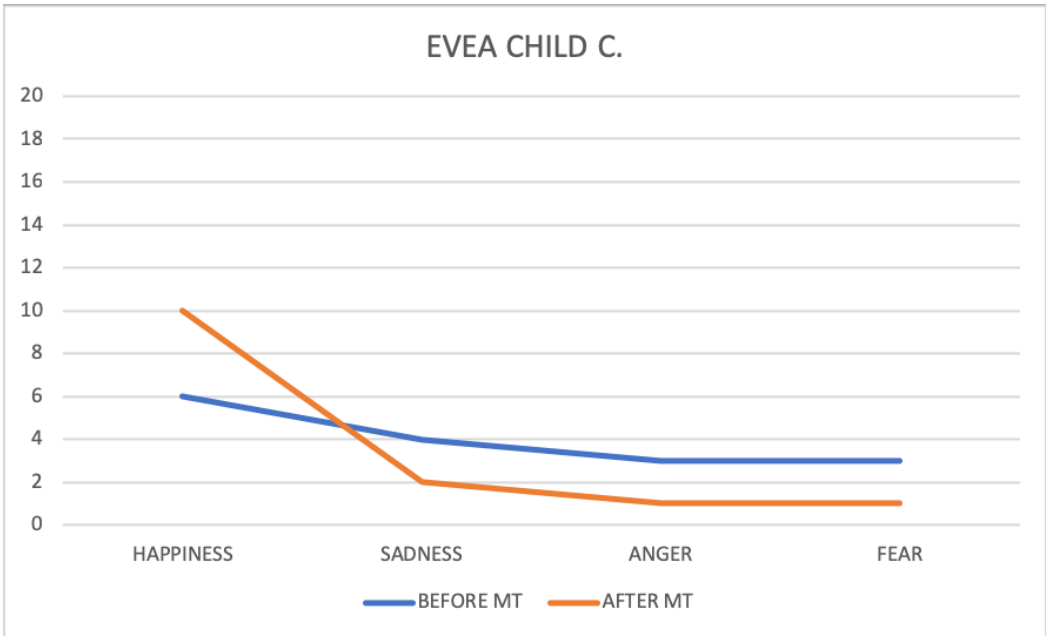


Figure 7. *Mood results in C. Pre-Post MT intervention*

Family´s perception

	BEFORE MT	AFTER MT
Happiness	18	31
Sadness-Depression	22	18
Anger-Hostility	21	3
Fear-Anxiety	26	15

Table 12. *Family mood results in C. case*

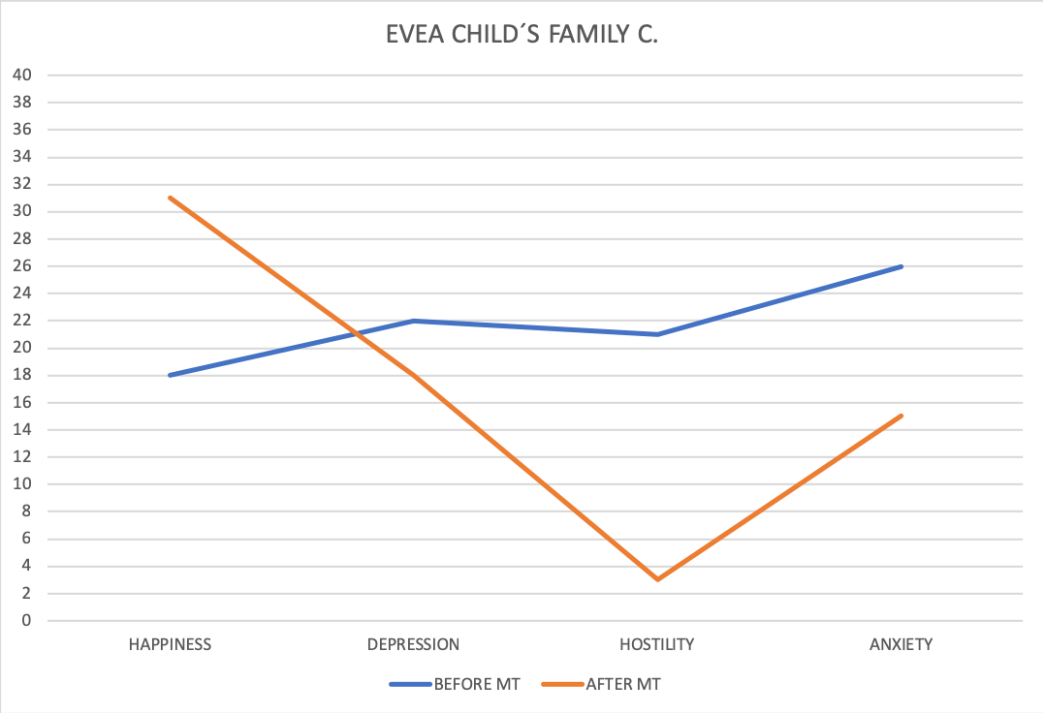


Figure 8. *Family´s mood results Pre-Post MT intervention in C. case*

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSTMENT
Happiness	18	4,5	31	7,75
Sadness-Depression	22	5,5	18	4,5
Anger-Hostility	21	5,25	3	0,75
Fear-Anxiety	26	6,5	15	3,75

Table 13. *Adjustment between A. results in mood and her family with a score of evea scale, used with parents (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between Child and Family´s perception**

	BEFORE MT		AFTER MT	
	Child	Family	Child	Family
Happiness	6	4,5	10	7,75
Sadness-Depression	4	5,5	2	4,5
Anger-Hostility	3	5,25	1	0,75
Fear-Anxiety	3	6,5	1	3,75

Table 14. Comparison between C. mood results and her family´s perception

It can be observed that, according to child´s perception, that her mood improved after MT treatment.
In the case of family´s scorings, the Fear-Anxiety decreased 3,5 points; Anger-Hostility-Depression decreased 2 points; Sadness-Depression decreased 3 points, and Happiness increased 4 points.

The results presented some differences between child and her family. The highest difference was in “Fear-Anxiety” before MT where child pointed with a 3 and her family with a 6,5. However, the results after MT were much more similar.

Nurse´s perception

	BEFORE MT	AFTER MT
Happiness	21	23
Sadness-Depression	25	1
Anger-Hostility	22	8
Fear-Anxiety	25	3

Table 15. *Nurse results in mood in C. case, with a score in the evea scale from 0 to 40*

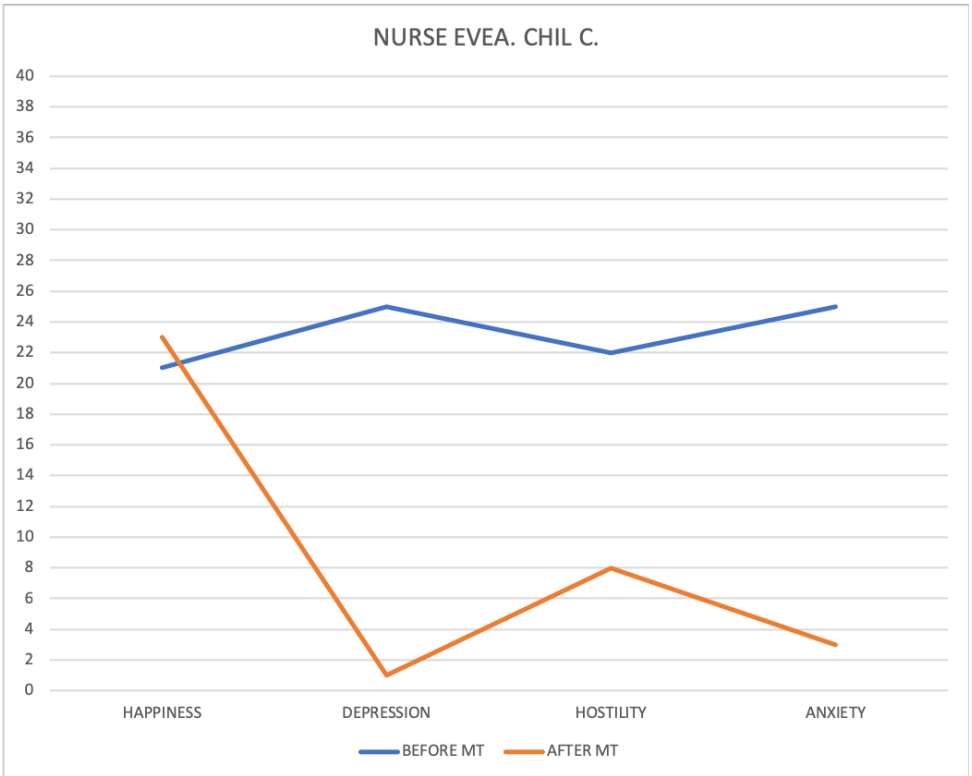


Figure 9. *Nurse results in mood in C. case Pre-Post MT intervention*

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSTMENT
Happiness	21	5,25	23	5,75
Sadness-Depression	25	6,25	1	0,25
Anger-Hostility	22	5,5	8	2
Fear-Anxiety	25	6,25	3	0,75

Table 16. *Adjustment between C. results in mood and the nurse, with a score of evea scale, used with parents (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between Child and Nurse´s perception**

	BEFORE MT		AFTER MT	
	CHILD	NURSE	CHILD	NURSE
Happiness	6	5,25	10	5,75
Sadness-Depression	4	6,25	2	0,25
Anger-Hostility	3	5,5	1	2
Fear-Anxiety	3	6,25	1	0,75

Table 17. *Comparison between C. results in mood and the nurse´s perception*

We realized, as with the child´s perception and family´s perception, that there was an improvement after MT treatment related to the child´s mood.
Her Fear-Anxiety decreased 5,5 points; Anger-Hostility decreased 3,5 points; Sadness-Depression decreased 6 points, and Happiness increased 0,5 points.

The results showed that there were some differences in the mood´s perception. For the once hand, Before Mt, the major difference was in “Fear-Anxiety”, where child scored with a 3, and nurse with a 6,25, which is more than double. For the other hand, After MT, there was no concordance in “Happiness”, because child scored with 10, and her family with 5,75, which is almost double as well.

- **Group results in C. case**

	BEFORE MT			AFTER MT		
	Child	**Family**	**Nurse**	**Child**	**Family**	**Nurse**
Happiness	6	4,5	5,25	10	7,75	5,75
Sadness-Depression	4	5,5	6,25	2	4,5	0,25
Anger-Hostility	3	5,25	5,5	1	0,75	2
Fear-Anxiety	3	6,5	6,25	1	3,75	0,75

Table 18. *Group results in mood: C., her family and the nurse*

These scorings showed that not in all parameters we could find similitudes. For example, “Fear-Anxiety” before MT was double if it said by the family respect to the child or the nurse. Another example was “Happiness” after MT, which is double too if it was said by the child, respect to the family.

4.1.2.3 CHILD D.

	BEFORE MT	AFTER MT
Happiness	5	7
Sadness	7	2
Anger	7	3
Fear	7	3

Table 19. *Mood results in D:*

It may remarkable that there was an improvement in his mood after MT. His happiness increased 2; His sadness decreased 5 points; Anger decreased 5 points, and Fear decreased 4 point.

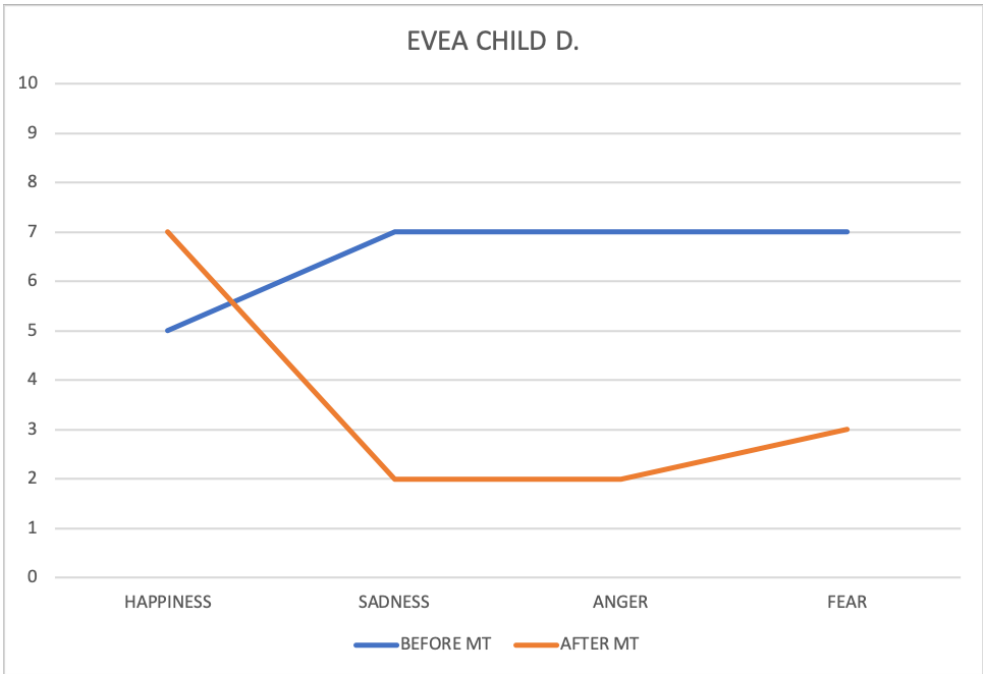


Figure 10. *Mood results in D. Pre-Post MT intervention with a score in the evea scale from 0 to 10*

Family´s perception

	BEFORE MT	AFTER MT
Happiness	19	27
Sadness-Depression	20	9
Anger-Hostility	24	8
Fear-Anxiety	22	10

Table 20. *Family mood results in D., with a score in the evea scale from 0 to 40*

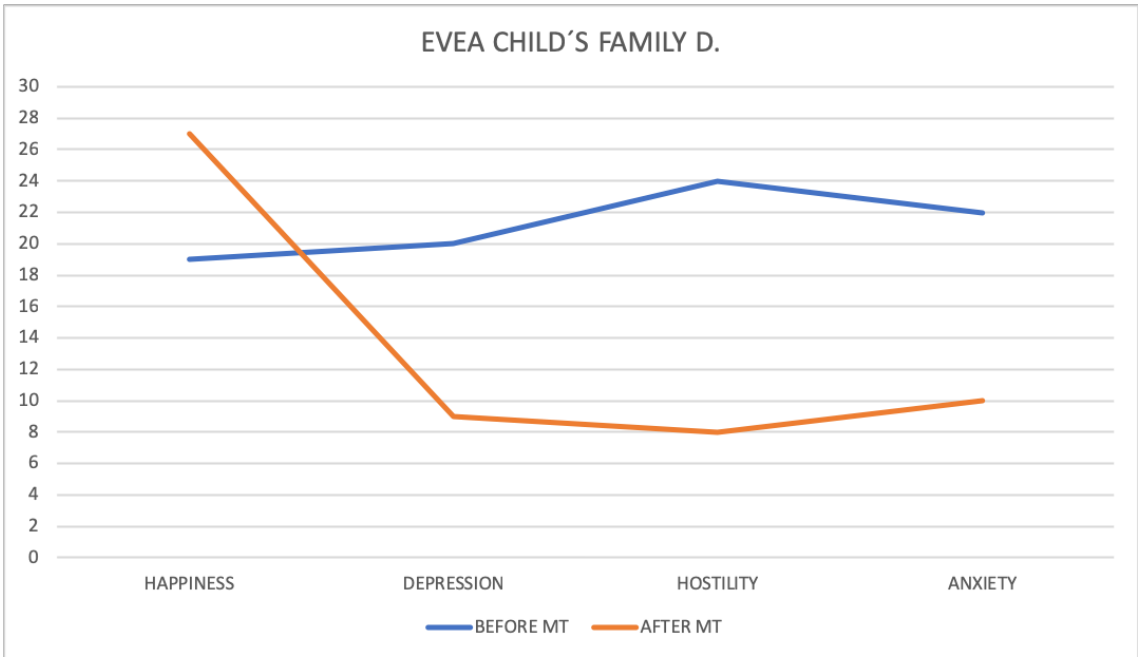


Figure 11 *Family mood results in D. Pre-Post MT intervention with a score in the evea scale from 0 to 40*

It could be suggested, as with Child´s results, that there was an improvement after MT, according to family´s perception.

The anxiety decreased 12 points; Hostility decreased 16 points; Depression decreased 11 points, and Happiness increased 8 points.

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSTMENT
Happiness	19	4,75	27	6,75
Sadness-Depression	20	5	9	2,25
Anger-Hostility	24	6	8	2
Fear-Anxiety	22	5,5	10	2,5

Table 21. *Adjustment between D. results in D. and his family, with a score of evea scale, used with parents (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between family and child´s perception**

	BEFORE MT		AFTER MT	
	Child	Family	Child	Family
Happiness	5	4,75	7	6,75
Sadness-Depression	7	5	2	2,25
Anger-Hostility	7	6	3	2
Fear-Anxiety	7	5,5	3	2,5

Table 22. *Comparison between D. results in mood and his family´s perception*

It might be corroborated as with Child´s results, that there was an improvement after MT, according to family´s perception.

The Fear-Anxiety decreased 4 points; Anger-Hostility decreased 4 points; Sadness-Depression decreased 3,25 points, and Happiness increased 2 points.

In this case, the coincidences between the child and his family were very closed, both before and after MT. We found the biggest difference in “happiness” with 1,75 point of difference between the child and his family, both before and after MT treatment.

Nurse´s perception

	BEFORE MT	AFTER MT
Happiness	23	27
Sadness-Depression	9	16
Anger-Hostility	18	12
Fear-Anxiety	14	8

Table 23. *Nurse results in mood in D. case, with a score in the evea scale from 0 to 40*

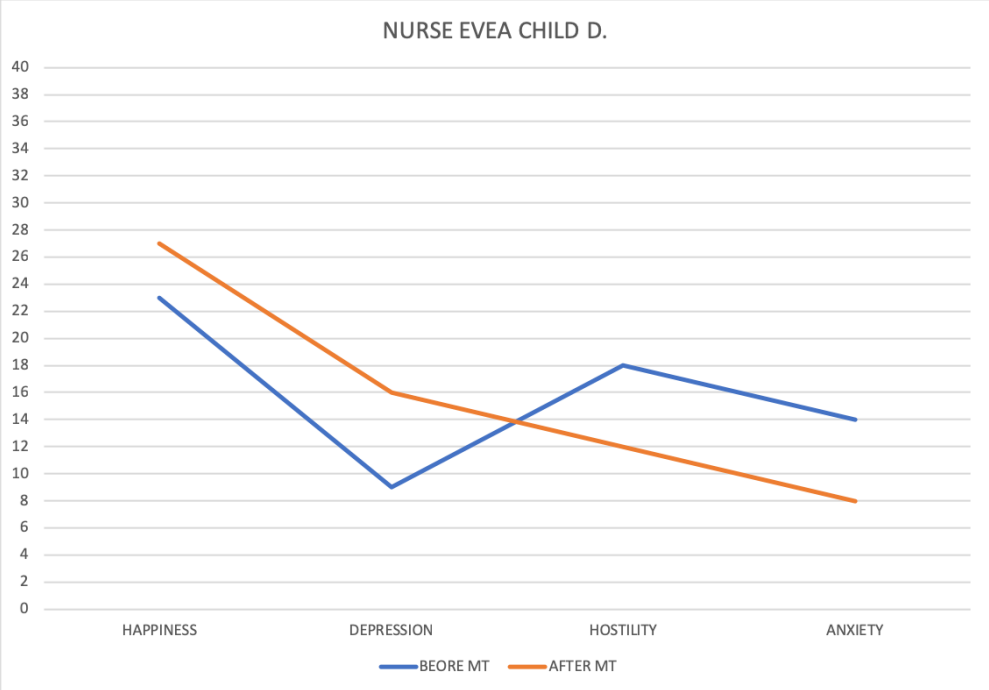


Figure 12 *Nurse results in mood Pre-Post MT intervention*

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSTMENT
Happiness	23	5,75	27	6,75
Sadness-Depression	9	2,25	16	4
Anger-Hostility	18	4,5	12	3
Fear-Anxiety	14	3,5	8	2

Table 24. Adjustment *between D. results in mood and his family, with a score of evea scale, used with parents (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between Child and Nurse´s perception**

	BEFORE MT		AFTER MT	
	Child	Nurse	Child	Nurse
Happiness	5	5,75	7	6,75
Sadness-Depression	7	2,25	2	4
Anger-Hostility	7	4,5	3	3
Fear-Anxiety	7	3,5	3	2

Table 25. *Comparison between D. results in mood and the nurse´s perception*

It can be corroborated, in accordance with the child and his family, that there was an improvement in the child´s mood after MT in every situation. The highest variable before MT was “Happiness” with 5,75, and after MT was still the highest with an improvement of 1 point. On the other hand, the lowest emotion before music therapy was Sadness-Depression with a 2,25 before MT, and an increasement of 1,75 points after MT.

It can be pointed out, that there were big differences before MT, in all the variables, except “Happiness” where was very similar. However, in all the rest the differences were double even more.

- **Group results in D. case**

	BEFORE MT			AFTER MT		
	Child	Family	Nurse	Child	Family	Nurse
Happiness	5	4,75	5,75	7	6,75	6,75
Sadness-Depression	7	5	2,25	2	2,25	4
Anger-Hostility	7	6	4,5	3	2	3
Fear-Anxiety	7	5,5	3,5	3	2,5	2

Table 26. *Group results in mood: D., his family and the nurse*

The results presented some differences. The perception of the nurse regarding “Sadness-Depression” and “Fear-Anxiety” was half in comparison to the child or his family. However, results after MT were more similar.

4.1.2.4 CHILD A.

	BEFORE MT	AFTER MT
Happiness	5	8
Sadness	3	3
Anger	7	5
Fear	2	1

Table 27. *Mood results in A., with a score in the evea scale from 0 to 10*

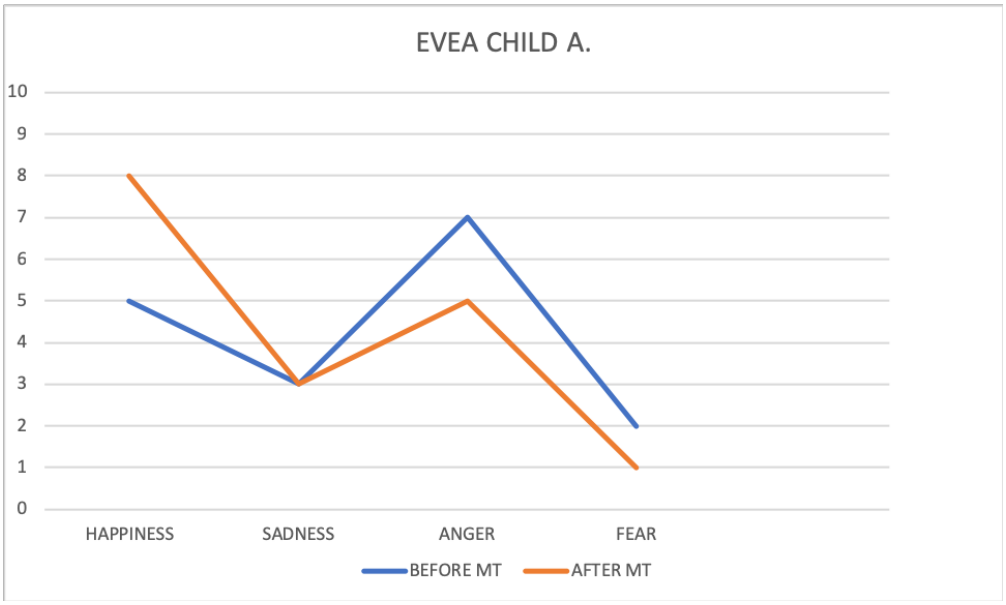


Figure 13. *Mood results in A. Pre-Post MT intervention*

It could be said, that there was an improvement after MT in her mood.

Her happiness increased 2 points; Sadness didn´t change; Anger decreased 2 points; and Fear decreased 1 point.

Family´s perception

	BEFORE MT	AFTER MT
Happiness	8	27
Sadness-Depression	27	9
Anger-Hostility	36	8
Fear-Anxiety	35	10

Table 28. *Family mood results in A.*, with a score in the evea scale from 0 to 40

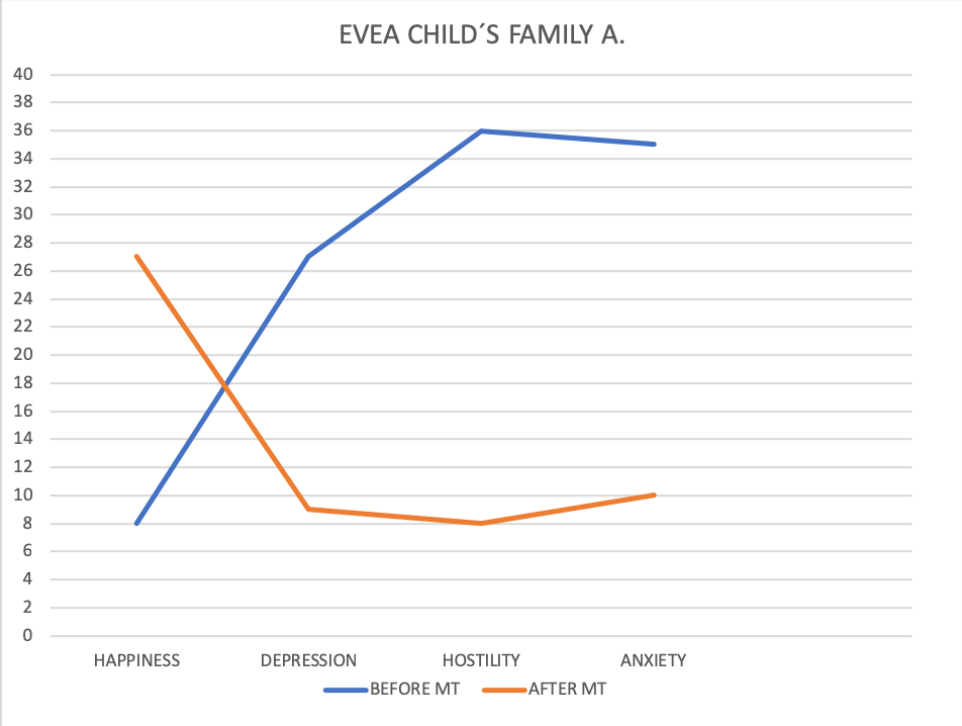


Figure 14. *Family mood results in A. Pre-Post MT interventiion*

It might be remarkable that there was a great improvement after MT.

Her anxiety decreased 15 points; Hostility decreased 28 points; Depression decreased 12 points, and Happiness increased 19 points.

In this case, the improvement was greater according to the perception of the family compared to the perception of the child.

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSTMENT
Happiness	8	2	27	6,75
Sadness-Depression	27	6,75	9	2,25
Anger-Hostility	36	9	8	2
Fear-Anxiety	35	8,75	10	2,5

Table 29. *Adjustment between A. results in mood and her family, with a score of evea scale, used with parents (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between Child and Family´s perception**

	BEFORE MT		AFTER MT	
	Child	Family	Child	Family
Happiness	5	2	8	6,75
Sadness-Depression	3	6,75	3	2,25
Anger-Hostility	7	9	5	2
Fear-Anxiety	2	8,75	1	2,5

Table 30. *Comparison between A. results in mood and her family´s perception*

Findings showed that there was a great improvement after MT.

Her Fear-Anxiety decreased 6,25 points; Anger-Hostility decreased 7 points; Sadness-Depression decreased 4,25 points, and Happiness increased 4,75 points.

In this case, the improvement was greater according to the perception of the family compared to the perception of the child.

The results of the comparison of perceptions exhibited many differences, especially before MT, where scores show in some parameters like “Fear-Anxiety” is 4 times higher in the family´s perception than in child´s.

If we can pay attention to the results after MT, the differences were not higher, only in “Anger-Hostility” it may be appreciate a big difference, between a 5 scored by the child, and a 2,5 scored by the family.

Nurse´s perception

	BEFORE MT	AFTER MT
Happiness	5	17
Sadness-Depression	36	19
Anger-Hostility	36	16
Fear-Anxiety	29	19

Table 31. *Nurse results in mood in A. case, with a score in the evea scale from 0 to 40*

The results indicated, as with the family, that there was a great improvement in the child´s mood after MT.

Her anxiety decreased 10 points; Hostility decreased 20 points; Depression decreased 17 points, and Happiness increased 12 points.

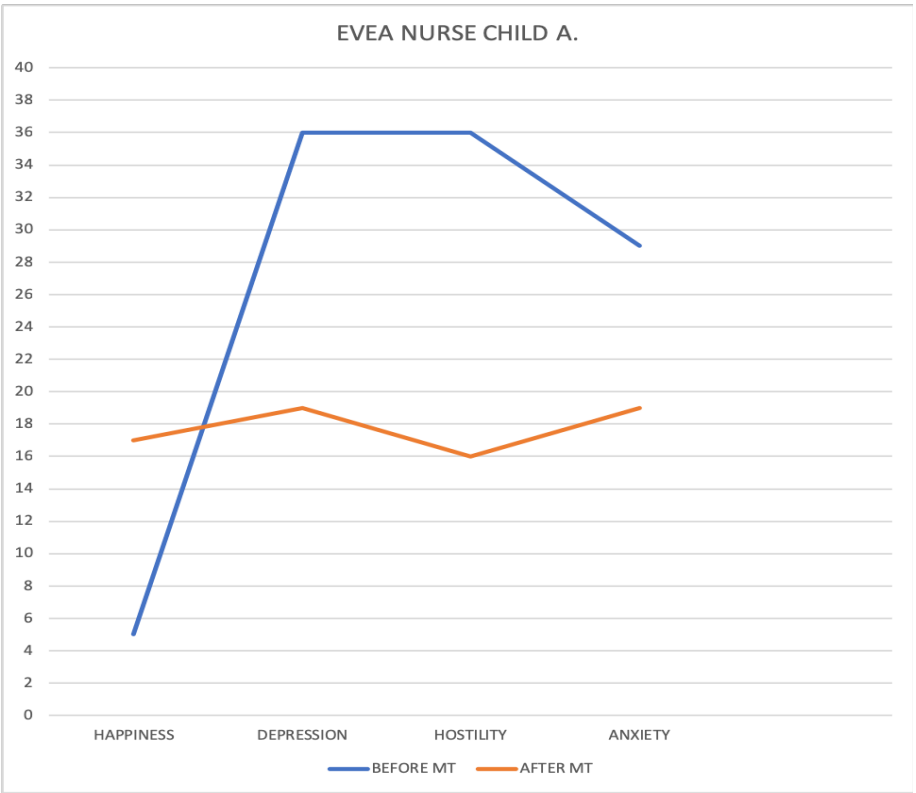


Figure 15 *Nurse results in mood Pre-Post MT intervention*

	BEFORE MT	ADJUSTMENT	AFTER MT	ADJUSTMENT
Happiness	5	1,25	17	4,25
Sadness-Depression	36	9	19	4,75
Anger-Hostility	36	9	16	4
Fear-Anxiety	29	7,25	19	4,75

Table 32. *Adjustment between A. results in mood and the nurse, with a score of evea scale, used with parents (from 0 to 40) with a score of evea scale, used with children (from 0 to 10)*

- **Comparison between Child and Nurse´s perception**

	BEFORE MT		AFTER MT	
	Child	Nurse	Child	Nurse
Happiness	5	1,25	8	4,25
Sadness-Depression	3	9	3	4,75
Anger-Hostility	7	9	5	4
Fear-Anxiety	2	7,25	1	4,75

Table 33. *Comparison between A. results in mood and the nurse´s perception*

It may be appreciated, as with the family, that there was a great improvement in the child´s mood after MT.

Her Fear-Anxiety decreased 3 points; Anger-Hostility decreased 5 points; Sadness-Depression decreased 5,75 points, and Happiness increased 3 points.

However, there were big differences between Child and Nurse with a distance of more than the double in parameters like “Fear-Anxiety” before and after MT, or “Happiness” before and after MT. The greatest similarities were founded in “Anger-Hostility” where there was only a slight difference before and after MT, or “Sadness-Depression” only after MT.

- **Group results in A. case**

	BEFORE MT			AFTER MT		
	Child	Family	Nurse	Child	Family	Nurse
Happiness	5	2	1,25	8	6,75	4,25
Sadness-Depression	3	6,75	9	3	2,25	4,75
Anger-Hostility	7	9	9	5	2	4
Fear-Anxiety	2	8,75	7,25	1	2,5	4,75

Table 34. *Group results in mood. A., her family and the nurse*

This case showed many differences in the perception of the child, her family and the nurse.

We found similarities in the sample of the family and the nurse, but this didn´t happen between child and the nurse, and only in “Anger-Hostility” before MT, and “Sadness-Depression” after MT.

4.2 GROUP RESULTS

4.2.1 Pain group results

If we pay attention to the scores of the group, observing the average obtained before the treatment of MT it could be evidenced that this score is (X = 2.5), while the average score after the treatment is (X = 1.25), which reflected an improvement in the perception of subjective pain.

	BEFORE MT	AFTER MT	DIFFERENCE
CHILD S.	2	1	-1
CHILD C.	0	0	0
CHILD D.	3	2	-1
CHILD A.	5	2	-3

Table 35. Group results in pain

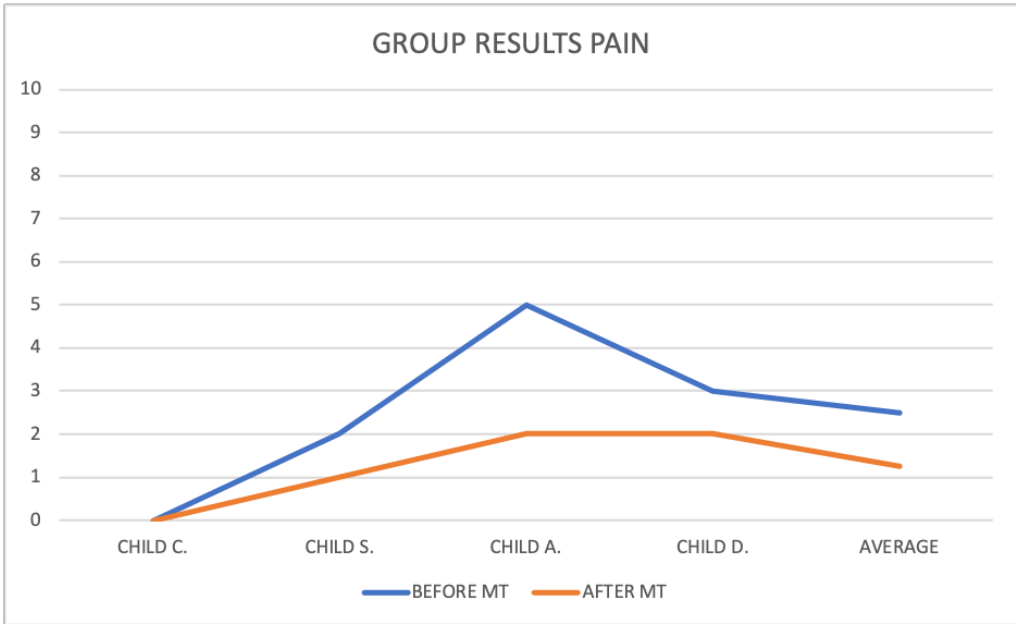


Figure 16. *Group results in pain Pre-Post MT intervention*

4.2.2 Mood group results

Once we had valued the results before and after MT, and make the adjustment between the results of the family and nurse, and the results of the children, we calculated the average scorings and the standard deviation.

The next step was to translate the standard deviation results to the Social Science Statistic test to get to know if the final punctuation had a significance value or not.

- **CHILDREN´S RESULTS**

	BEFORE MT					AFTER MT				
	Child S.	Child C.	Child D.	Child A.	Average	Child S.	Child C.	Child D.	Child A.	Average
Happiness	8	6	5	5	6	10	10	7	8	8,75
Fear	1	3	7	2	3,25	0	1	3	1	1
Sadness	2	4	7	3	4	0	2	2	3	1,75
Anger	1	3	7	7	4,5	0	1	2	5	2

Table 36 *Group results of mood in children, with a score in the evea scale from 0 to 10*

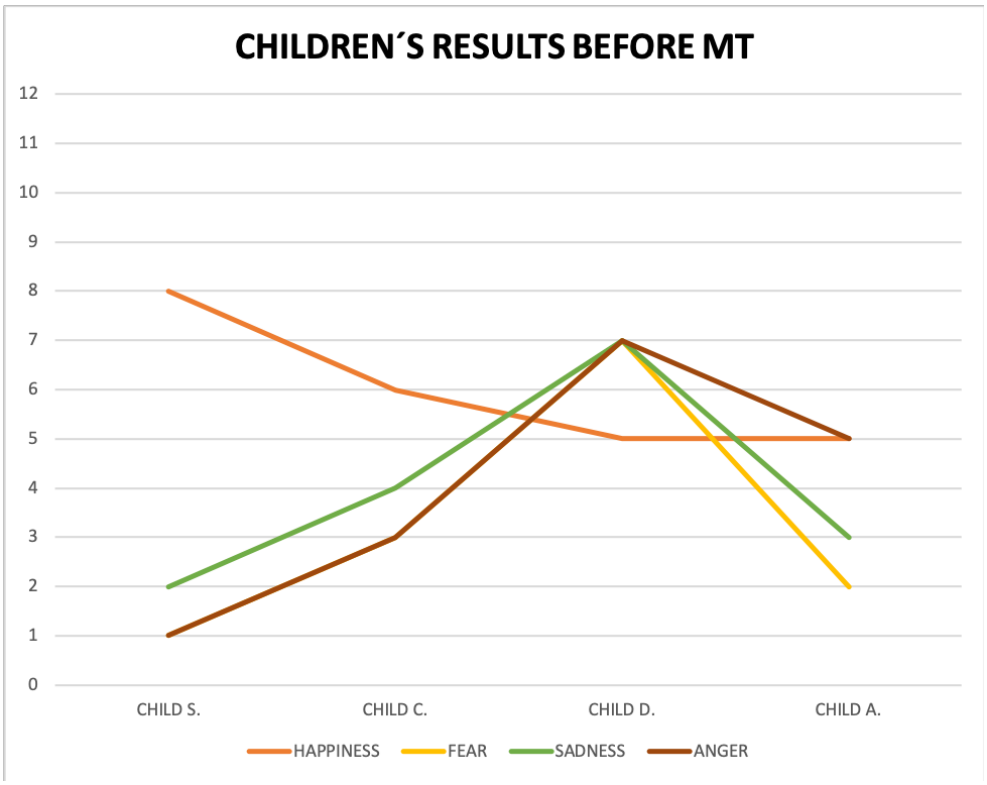


Figure 17 *Group results of mood in children before MT intervention*

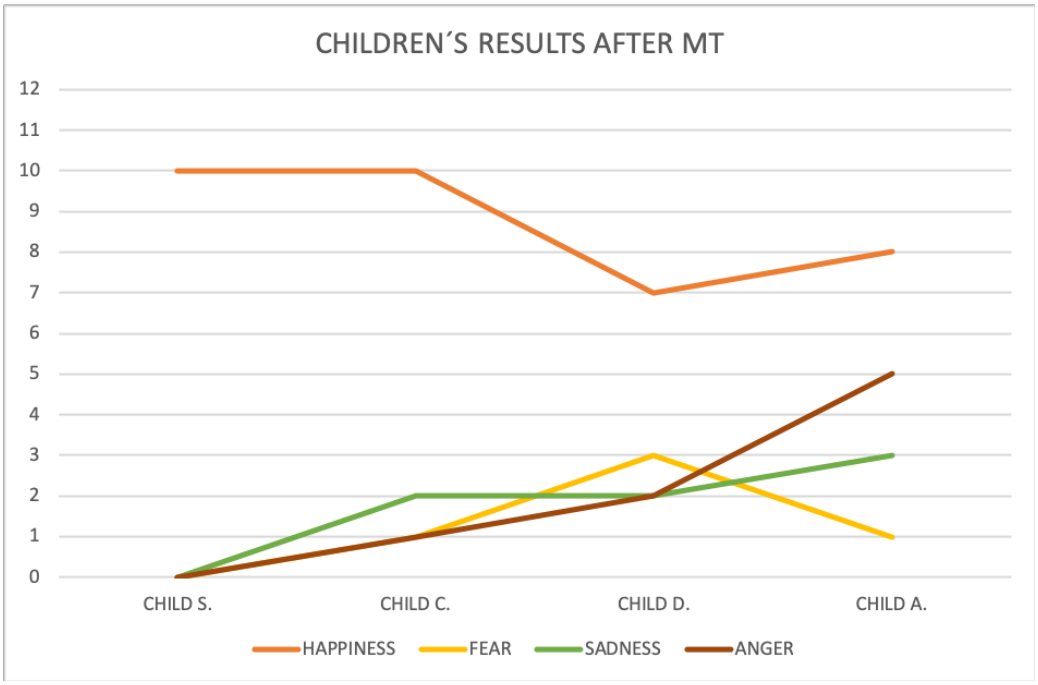


Figure 18. *Group results of mood in children after MT intervention*

	Average		St. Deviation	
	Before MT	After MT	Before MT	After MT
Happiness	6	8´75	1´41421356	1´5
Fear	3´25	1´25	2´62995564	1´25830574
Sadness	4	1´75	2´1602469	1´25830574
Anger	4	2	2´5819889	2´1602469

Table 37. *Average results and St. deviation of mood in children*

Taking into consideration the average results, there was an improvement of mood after MT. Happiness increased 2´75 points; fear decreased 2 points; Sadness decreased 3´25 points, and Anger decreased 2 points.

In addition to these results, the Paired Sample T-Test means showed that the result is significant at p. < 0.5

- **FAMILY´S RESULTS**

Once we had the group results, we had to establish an adjustment between family´s results and children´s results.

	FAMILY´S S.		FAMILY´S C.		FAMILY´S D.		FAMILY´S A.	
	Before MT	After MT	Before MT	After MT	Before MT	After MT	Before MT	After MT
Happiness	4,5	7,25	4,5	7,75	4,75	6,75	2	6,75
Fear-Anxiety	2,5	1,75	5,5	4,5	5	2,25	6,75	2,25
Sadness-depression	2	1	5,25	0,75	6	2	9	2
Anger-Hostility	1,75	1,5	6,5	3,75	5,5	2,5	5,5	2,5

Table 38. *Families group ´results in mood*

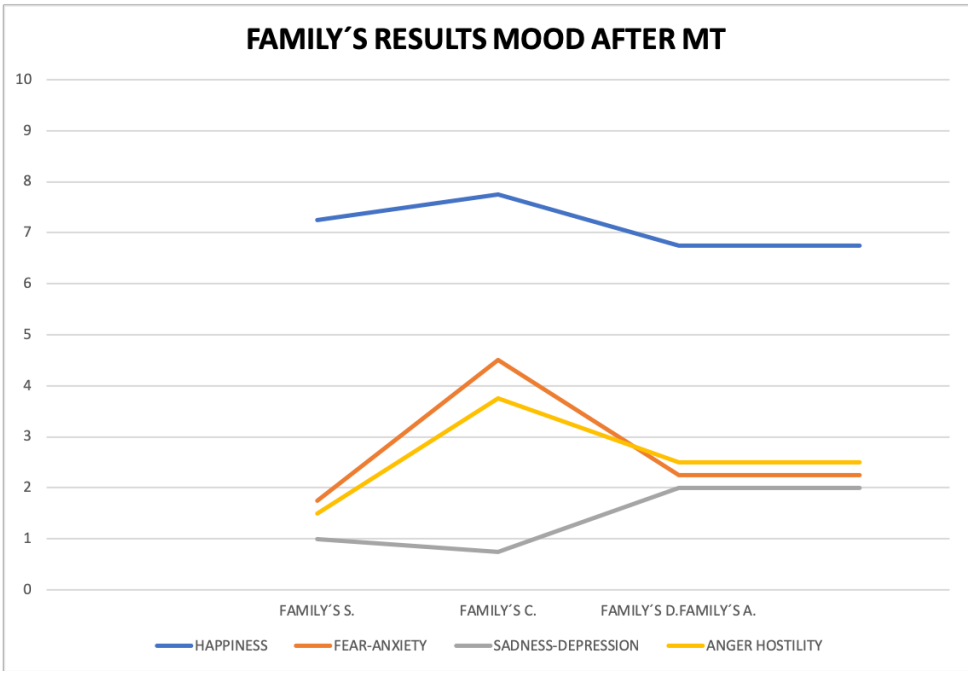


Figure 19. *Families results in mood before MT intervention*

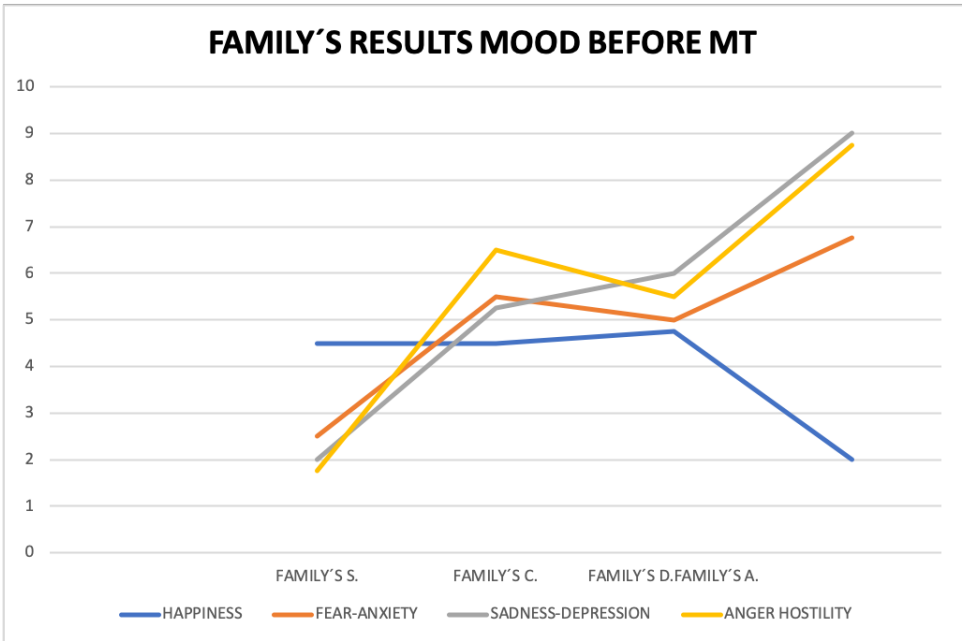


Figure 19. *Families results in mood after MT treatment*

	Average		St. deviation	
	Before MT	After MT	Before MT	After MT
Happiness	3,9375	7,125	1,29703187	0,47871355
Fear-Anxiety	4,9375	2,6875	13,2	1,23110723
Sadness-Depression	5,5625	1,4375	2,875	0,65748891
Anger-Hostility	5,625	2,5625	2,91904665	0,92138935

Table 39 *Average results and st. deviation in mood of families*

The average results presented an improvement of mood after MT. Happiness increased 3,1875 points; Fear-Anxiety decreased 2´25 points; Sadness-Depression decreased 4,125 points, and Anger-Hostility decreased 3,0625 points,

In addition to these results, the Paired Sample T-Test showed that the value of t was 2.647874, the value of p was .01827., so the result was significant at $p < .05$.

- **NURSE´S RESULTS**

	CHILD S.		CHILD C.		CHILD D.		CHILD A.	
	Before MT	After MT	Before MT	After MT	Before MT	After MT	Before MT	After MT
Happiness	7,25	7,75	5,25	5,75	5,75	6,75	1,25	4,25
Fear-Anxiety	4,5	0	6,25	0,25	2,25		9	4,75
Sadness-Depression	2	0,25	5,5	2	4,5	16	9	4
Anger-Hostility	1,75	0,75	6,25	0,75	3,5	12	7,25	4,75

Table 40. *Nurses results in mood*

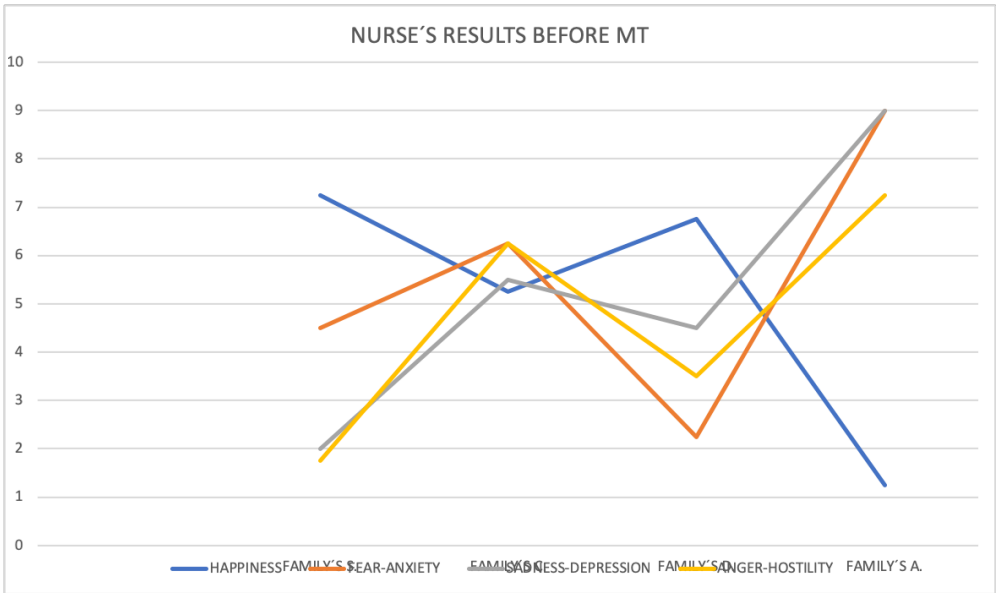


Figure 21. *Nurses results in mood before MT intervention*

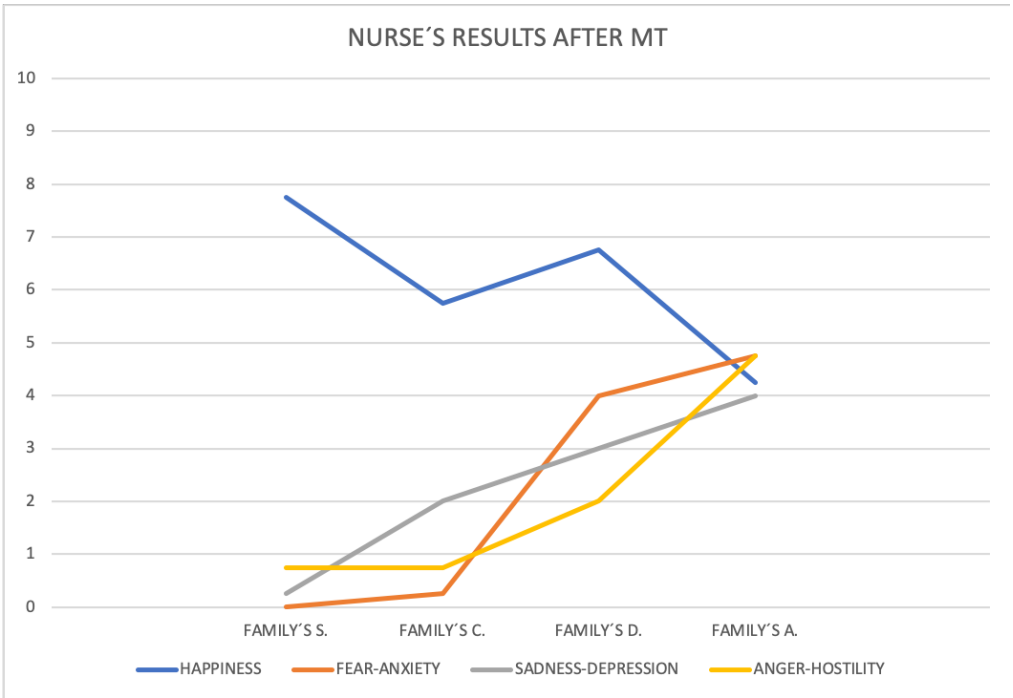


Figure 22. *Nurses results in mood after MT intervention*

	Average		St. Deviation	
	Before MT	After MT	Before MT	After MT
Happiness	4,875	6,125	2,71952815	1,49303941
Fear-Anxiety	5,9375	2,25	2,85043856	2,47487373
Sadness-Depression	4,875	2,3125	2,9011492	1,59915342
Anger-Hostility	4,3125	2,0625	2,51971394	1,88607838

Table 41. *Average results and St. deviation in mood of nurses*

The average results suggested, that, according to Children and family´s results, there was an improvement after MT. Happiness increased 1,25 points; Fear-Anxiety decreased 3,6875 points; Sadness-Depression decreased 2,5625 points, and Anger-Hostility decreased 2´25 points.

However, in addition to these results, the Paired Social T-Test showed that the value of t was -1.191807. The value of p was .25185. so, the result was not significant at $p < 0.05$.

In the next chapter, will try to explain these results

CHAPTER V. DISCUSSION

The purpose of this study was to investigate how active music therapy can influence in subjective perception of pain and mood in four children with cancer in the diagnosis phase.
In this chapter I summarize and discuss the findings in subjective perception of pain and mood, relating my findings to the literature, add some reflections on the study and highlight limitations and clinical applications of my work.

5.1 Summary of findings and discussion

This section is divided in three parts related to my research question: results from the children, parents' perception of their children's subjective pain and mood, and nurse´s perception of children´s subjective pain and mood.

5.1.1 Discussion of children´s results

The results of the children in general terms, have shown a tendency of decrease with respect to the subjective perception of pain, as well as an improvement in mood after 5-6 sessions of active music therapy, as it was expected. This has also been corroborated by the perceptions of both parents and nurses.

- **Individual results in pain**

Related to the subjective perception of pain, measured with the Wong-Baker scale, we can observe that, in all of them the pain decreased after music therapy treatment. Child S. decreased from 2 to 1(Figure 1); Child D. decreased from 3 to 2 (Figure 2); Child A. decreased from 5, the maximum level, to 2. These results can due to they could be able to focus on the music during the sessions and forget the pain, their motivation to play was stronger than the pain, or they didn´t have the same type of cancer, Child D. and S. had cerebral tumor, and Child A,

had leukemia. Respect to the Child A´s results (Figure 3), it very important to take into consideration, not only that a leukemia involved to be in the hospital for one month and half, but she knew she had cancer. This aspect can have influenced in her results, before and after music therapy. The increasing of pain perception is a physiological measure that may be affected in children with cancer. Depending on their ability to adapt to the new situation, they will have higher or lower levels of anguish, pain, mood, which will manifest in their commitment to treatment. (Colwell, Edwards, Hernández & Brees, 2013).

In Child C., however, results haven´t been what were expected. She covered the Wong-Baker scale, but her scores were 0 before and after music therapy treatment. This could be due to her scores in anger, fear and sadness which were a bit higher, and she could feel confusing about her feelings. According to Edwards (2005), it is important to remember, that it is very frequent that children with pain are very frightened and many times they may have difficulties to distinguish between pain and frightening reactions.

- **Group results in pain**

Taking into consideration the results of the subjective perception of pain, observed from a group perspective, it can be said that the trend at the group level has been positive and there has been a decrease in their perception of pain after music therapy treatment (Figure 16).

The average result before MT was 2,5 out of, and after MT 1,25, so there was a decline of 1,25 (Table 35). Moreover, the St Deviation results were, 2,08before MT, and 0,95 (Table 36). Although it is not a great descent, the tendency it is positive and could be attributed to music therapy. In addition, these results are similar to those found in the study carried out by Colwell, Edwards, Hernandez & Bres (2013) whose results showed a significant improvement in pain after a single session of music therapy with pediatrics, with the difference that in their case only had a single session of active music therapy.

In the same way, Verstegen and Silverman (2018), found a positive trend in reducing pain, by applying active music therapy in patients hospitalized for bone

marrow transplantation, although they recommend to repeat the study with a big sample.

It would also be advisable to include in a future study related to the pain in oncology pediatrics, other aspects that may influenced in pain, stress. Music therapy may help relieve pain experienced by people with cancer by relaxing them and facilitating communication, so that they are more able to share their fears and emotions, which, in turn, helps these patients relax. (Hart, 2009)

- **Individual results in mood**

Results in mood were measured with an adaptation for children, of EVEA scale, based on basic emotions: happiness, fear, anger and sadness. It has mostly changed positively, as expected.

As can be seen in the individual results, respect to “Happiness”, Child S. (Table 3) changed from 8, out of 10, to 10; Child C. (Table 11) from 6 to 10; Child D. (Table 19) from 5 to 7, and Child A. (Table 27) from 5 to 8. Respect to “Fear” Child S. changed from 1 to 0; Child C. from 3 to 1; Child D. from 7 to 3 and Child A. from 2 to 1. Scores in “Sadness” were Child S. changed from 1 to 0; Child C. from 4 to 2, Child D. from 7 to 2. Child A. didn´t changed her perception of Sadness, with a 3 before and after MT. It is not a great score but the fact that it hadn´t change, could have been due to her stay at hospital was longer than in other cases like S. and D. In musical terms, her comments at the end of the sessions were always to feel more relaxed, although her improvisations were most of the time in a minor tone. Lastly, “Anger” exhibited a decrease in all the children. So, Child S. changed from 1 to 0; Child C. from 3 to 1, Child from 7 to 2, and Child A. from 7 to 5. We can appreciate the highest change in “anger” in Child D. From my point of view, Music therapy could have influenced in his perception of anger. The sessions with this small child always finished with a change in his attitude, more active and collaborative and without the frowning expression he used to have at the beginning.

These results could due to music therapy. The environment during the sessions was a comfortable space where their timing was respected in every moment which allowed them to make decision about how and when to play or to talk. I let them guide me and I followed their lead. This improved the attention of the child and his engagement in the interaction. Children were let free to express themselves in the setting, and their production were acknowledged and reinforced

These results are similar as those found in Bradt (2010), where children felt calmer and happier at the end of MT sessions, in spite of her study consisted of 2 sessions of active music therapy. Another aspect to take into consideration in this study was that the participation of the children progressively increased, which could be a symptom of they felt better. Active engagement is essential if children are to learn positive coping strategies that will help buffer the impact of stress related to hospitalization and treatment for cancer (Robb, Clair, Watanabe, Monahan, Azzouz, Stouffer, Ebberts, Darsie, Whitmer, Walker, Nelson, Hanson-Abromeit, Lane and Hannan, 2008)

- **Group results in mood**

The group results of the children (Table 36) in mood presented an improvement after Music therapy treatment. If we pay attention, we can realize that all the aspects have a positive effect. The average results showed a change in happiness from 6 to 8,25; Fear a decline from 3,25 to 1,25; Sadness is the aspect that exhibit a mayor change with a decrease from 4 to 1,75 after MT. This could be due to children were more active after sessions and they usually told their parent what they had made in session. The last aspect is “anger” which also showed a decline from 4 to 2 after MT. These changes could be attributed to MT. During the sessions, a safe space was created for expression, and for opportunities for active spontaneous musical play.

In addition to this, the results from St deviation (Table 37) showed a positive trend in mood. “Happiness” changed from 1,41 to 1,5; Fear changed from 2.62 to 1,25;

Sadness from 2,16 and “Anger” from 2,58 to 2,16. Moreover, the Paired Social T-Test utilized in this study had a significant result at p <.05. (t is 3.181004, and the value of p is 01547.

All these positive scores could be the result of the music therapy effect, and are similar are those found by Letwin and Silverman (2016), the patient of their study said that Music therapy had a positive trend in improving the therapeutic relation and mood. While there are differences between their study and this one, since they conducted 2 sessions of active music therapy and it was a mixed study.

5.1.2 Family´s perception of children´s mood

The findings from family´s perception related to children mood showed an improvement in mood after MT, although not in the same way in all cases.

Taking Child S.'s results as a reference and comparing them to his family's results, (Table 6) we can observe that there was a positive change after MT. While parents' perception of their child's happiness was lower than the child's, at the same time they observed a large increase after MT. This could be due to parents are very worried about the illness, especially his mother, and S. was a child very protected by his parents, which could have influenced in the child´s perception of the reality.

Respect to Child C., the perception of her daughter´s mood was pretty similar, (Table 14) except in the aspect of “Fear-Anxiety”, where the child´s perception was lower than what her parents thought. However, her parents appreciated a great decline after MT in this parameter, from 6,5 to 3,75, while her daughter´s score changed from 3 to 1. It is also significant the decrease valued by the parents respect the “Anger” of her daughter from 5,25 to 0,75. This means that her parents thought that C. was angry in the beginning of the treatment, albeit it was not the child´s perception. This could mean that at first, C. didn´t want to speak, she liked music but missed a lot her sister but her sister couldn´t go to visit C. to the hospital. She used to ask for her mother if she was not with her in the hospital, so it could be mean that C. hadn´t adapt to the change of routines

and roles in the family. However, she found in the MT sessions a space for her, she began to show less angry, more talkative and participating in the music. Anyway, it had been recommendable to tray to include her sister in the sessions, as Knapp, Madden, Wang, Curtis, Sloyer & Shenkman (2009) made in their study. They found that it is very effective to work with pediatrics patients, in their case in a palliative care program, and their siblings. They carried out a qualitative study with interviews divided in two groups of work, control and experimental. Their findings exhibited that the quality of life of their ill child was excellent thanks to the Music therapy familiar program in palliative care. Moreover, the parents whose children´s siblings received MT felt very satisfied, and parents who reported that their children's siblings did not receive music therapy, indicated that they wanted their children's siblings to receive music therapy.

The results found in D. showed that both D.'s and his parents' perceptions of D.'s mood are fairly coincidental (Table 22). The EVEA scale was covered in the room and the music therapist was not present in that moment. But, D. was two years and half, so He could need mom´s help to covered the EVEA scale, so for that reason, the results were so overlapping. However, we could observe changed in D´s mood, especially significant is the changed we can be perceived in the decrease of Sadness, Anger and Fear, from 7 in all 3 variables to 2, 3 and 3 respectively in EVEA´s child, and from 5, 6 and 5,5 in the 3 variables before MT, to 2,25, 2 and 2,5 respectively after MT. The changes could be due to music therapy because D. was a very shy child, and Music therapy could have learnt that to adapt to the treatment and to the medical procedures. His mom told me that after MT he was more active and collaborative. In any case, it would have been more interesting to have used a type of assessment tool more suited to his age, and to have included his mom in the session. The patient/family feedback survey also revealed parents' reports that music therapy plays an important role in supporting their child during procedures, distracting them from pain and anxiety (Tucquet & Leung, 2014)

Lastly, findings of child A showed some differences between child´s results and her family´s perception of A.´s mood (Table 30). Her family thought that A. was less happy and more sad, angry and frightened, of A.´s answers. This could mean

that the expectations of the family respect Music therapy were very high or they didn´t really know how her child felt. parents highlighted family bonding as the most important component in relation to clinical outcomes, followed by assisting with their child's coping abilities, and providing an avenue for self-expression. (Tucquet & Leung, 2014)

Kemper and Lean (2008) interviewed parents of children with cancer in their study about their attitudes and expectations about music therapy for their children. Results showed that 87% of the parents had played music for their children at home in the preceding week, but 67% never played music for or listened to music with their children during a pediatric oncology visit. Most parents thought that music would comfort their children, and most parents believed that music would have positive effects, such as relaxation, comfort, distraction or energizing.

It would be interesting in a future study to include the family in the MT sessions, Lindenfelser, Hense & McFerran (2012) investigated the familiar with music therapy in a pediatric palliative program and heir results showed that despite the significant challenges faced by parents during this difficult time, parents described many positive experiences in music therapy. pediatric patients and their families need experiences that offer a sense of normalcy and control in an often chaotic environment. (Tucquet & Leung, 2014)

* Group results of the families

The results of the families, in general terms, showed a positive trend after MT (Table 38). The findings of St deviation presented Happiness 1,29, Fear-Anxiety 13,2; Sadness-Depression 2,87 and Anger-Hostility 2,91, before MT, and Happiness 0,48; Fear-Anxiety 1,23; Sadness-Depression 0,65, and Anger-Hostility 0,92, after MT (Table 39). In addition to this, the Paired Social T-Test used in this study gave a value of "t" 3.09, and the value for "p" 0.17, so the result was significant at $p < 05$.

These positive changes could have due to Music therapy, because they found in the sessions a space for playing, for exploring instruments, and a space where children can express with more freedom and encourage without the presence of their parents. The researchers O´Callaghan, Sexton and Wheeler (2007) stated: “The ‘value’, however, of children’s improved adjustment to adverse hospital experiences, through cathartic musical experiences, which can also increase self-esteem and joy, cannot always be fiscally determined.”

Parents referred to music therapy as playing an active role in helping their child to adjust to hospitalization and illness, develop positive coping strategies during long-term hospitalization, connect with the outside world and the normal part of themselves, and positively affect mental health and overall well-being. (Tucquet & Leung, 2014)

5.1.3 Nurse´s perception of children´s mood

The findings of the nurses' tests on their perception of the children's mood were positive and as expected.

If we pay attention respect child S. we observe that the nurse's perception was similar to that of the child in happiness, (Child 8, nurse 7.25) and higher in the other parameters before MT (Table 9). However, after MT the results were very coincident, so one could say that the nurse's perception of the child's mood, and the child's own perception after MT treatment was similar.

Results in Child C. showed similar scores before MT in all the parameters, except Fear-Anxiety, which was higher valued by the nurse than by the child (Table 17). Additionally, result after MT, were similar in all the parameters, except happiness, which was similarly valued by the nurse both before and after, i.e. there was hardly any change in the nurse's perception. This may be because nurses didn´t know children as well as their parents, and for this reason may have more difficulty appreciating their mood swings. Another reason may be that it was not the same nurse who covered the tests before and after the TM treatment, which may invalidate the results because it is not the same person's perception.

A remarkable aspect of Child D. is the perception of the nurse related to “Sadness-Depression”, which from her point of view, increased after MT. The rest of the parameters were more similar to the own child´s perception (Table 25). This result may have been due to the nurse's verbal difficulty in covering the scale. She said that being such a small and shy child it was difficult for her to know what her real mood was. Furthermore, D. was a very shy child and was distrustful of medical staff.

Child A. is the child where it could observe the highest change after MT treatment. Not only from the perspective from the own child and her family, but from the perspective from the nurse too (Table 33). Specifically, from the nurse's point of view, the scores are more contracting than those given by the girl herself. The girl's perception of happiness was lower than that of the girl herself, while all other parameters were much more highly valued by the nurse than by the girl. Also, changes after music therapy treatment are more pronounced according to the nurse's point of view. that is, happiness changed from 1.25 before MT, to 4.25 after MT; Sadness-Depression change from 9 to 4.25; Anger-Hostility changed from 9 to 4; and Fear-Anxiety changed from 7.25 to 4.75. As I have mentioned before, A. is the only child who knew that she had cancer. This aspect could have influenced in the perception of her and her family.

It was interesting to know the perception of the nurses related to the children. Kemper, Bouhairie, Martin and Woods in 2008 evaluated the attitudes of staff members in two different settings, a neonatal intensive care unit (NICU) and a pediatric outpatient hematology oncology unit. Their results showed that music could improve mood and music could lift spirits and boosted energy and vitality. Generally speaking, medically trained personnel view music therapy in a positive light and music could benefit the patient.

The nurse, is supposed to be a person with experience in working with these children, and in that sense can realize certain changes compared to other children's cases. At the same time, however, nurses do not know each child as much as their own family, and in this sense, they may also overlook certain changes in the child that are appreciable by the family but not by the nurse. Hence

the reasons for extracting information from the same parameters from different sources.

- **Group results of nurses**

The findings related to the children´s mood from the perspective of nurses presented positive changes after MT treatment.

These changes could be perceived in the St Deviation´s results. Happiness improved from 2,71 to 1,49; Fear-Anxiety decreased from 2,85 to 2,47; Sadness-Depression from 2,90 to 1,59, and Anger-Hostility from 2,51 to 1,88 (Table 41).

However, the social Science Statistic didn´t considered that the result was significant, the value of t is -1.19. The value of p is .25185. so, the result is not significant at $p < 0.05$.

This result could have due to it was not always the same person who covered the scale, so the results did not show the same perception of the same nurse with respect to the same child. This aspect, may have invalidated the results, so it would be advisable that in a future research, it was the same nurse who covered the per-post treatment tests. In the case of this study, this could not be done due to the fact that the nurses' shifts did not coincide with the child's discharge date.

According to Barry, Philippa, O´Callaghan, Wheeler, Greg, Grocke & Denise´s findings (2010), regarding the use of music therapy interventions in onco-pediatric patients. Medical staff valued this type of therapeutic support positively because it provided them with a happy and positive experience and facilitated communication and the exchange of opinions between the child and medical staff.

5.2 Design analysis and assessment

In this part, I will reflect on the characteristics of the design chosen for this study.

Concerning the description of the sample, the 4 children participating in the study were maintained throughout the music therapy treatment, although the sample is small to generalize results it can be observed a positive trend in the results of pain and mood. It would be advisable, however, to increase the sample size in future research.

On the other hand, no control group was made and the inclusion criteria were not very strict with the intention of reaching the largest number of children and extending Music Therapy to the whole unit. However, for a future study, it would be advisable to establish a control and experimental group, as well as to include more inclusion criteria: it would be more interesting for all children to have the same type of tumor because this influences their length of stay in hospital, In the case of this study, the children who received 5 sessions and not 6 were discharged to go home, so it was not possible to do one more session. In addition, it would be preferable they were within the same age, as this would also influence the type of techniques to be used.

With respect to the tests used, because the sample was not homogeneous in terms of age, if the Wong-Baker scale worked although the adaptation for children of the EVEA scale for mood did not work as expected with D., who was too small for comprehension.

A last aspect to emphasize was the person who covers the tests, both in the family and the medical staff. The fact that it is not the same person who covered the tests per-post treatment of Music Therapy reduces the reliability of the results and is an aspect to take into consideration for other researchers in the future.

5.3 Limitations

There are some limitations to mention for a future research.

The results couldn´t be compared with a control group because there was only an experimental group. The fact that there was only an experimental group made it impossible to compare results among children. Another aspect was that it was not the same person who covered the tests and the reliability of the results. This study followed a quantitative design, which has prevented us from referring to qualitative aspects, fundamentally human relationships. Children presented differences ages, from 2 to 9. This was too wide an age range, and it had as consequence it was difficult to apply egalitarian tests. Finally, the fact that the same person was the researcher and the music therapy made it difficult to distance oneself from the different cases.

5.4 Suggestions

Future investigators should include a control besides experimental group to compare results.

Moreover, the children should have in the same age and receive the number sessions. Maybe it could be useful too, all the children would have the same type of cancer, because this influences the length of time they are admitted to the hospital, and the number of Music therapy sessions they could receive.
The age of the participants should be the more homogeneous possible. The same age implies the same needs and the same development of the person, so that, the same techniques of Music Therapy could be applied to all of them.

Another interesting ´technique to apply would be the songwriting to make it contracted with this study that has been more instrumental. Additionally, it would be attractive, to value other parameters like the extent of children's participation in the sessions.

In this study, the instruments more appreciated by children were the piano but tambourines too, so it could be useful to tray to reduce the number of instruments and focus on the piano and tambourine to measure the degree of efficacy of these instruments, and how they influence them.

Lastly, it should the same person who cover the test before and after MT treatment, related to the family and to the medical team. Because otherwise, the results obtained can weigh on the objective assessment.

5.5 Conclusions

The present work was intended to answer the question if active MT could decrease and influence in the mood and pain of four children with cancer during the diagnostic phase. The final results suggest that MT can be considered an effective complementary therapy to offer children a better quality of life in a so difficult situation as the cancer is. Moreover, there is a relation between pain and mood and anxiety.

The music therapy helped them to find a way of communication that made them feel better. It is very important to respect their time of adaptation to therapy and to therapist. respect their time to play or not, create that safe space where they can approach the instruments to explore in a way they do not know, but where they find a channel of communication to seek their own relief as they feel at that time and where the word is not important. Parents' comments after each session are unanimous that they found their children better after the session. This improvement could be in the aspect that they were found to be more relaxed, more active or more joyful. In every session, children stayed more time in the music or musical game, and none of the complaint about pain during the treatment.

The biggest motivation for me to do this work was of this study was to increase awareness of the field of music therapy, in medical area. I think it is very important that music therapy is gaining weight in the medical community with positive and objectives results and we are, music therapist who have to work to get. Although it is necessary to do more investigation, findings of this study are a small contribution for further research in this field.

"He who accumulates many happy memories in his/her childhood is already saved forever" Dostoievski, S. XIX.

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-EOsvz8c3-M%253A%252CE6FTgmEsGws7BM%252C_&vet=1&usg=AI4_-kQZIGrgm6sdi045Cp0jZPT7fUgBOA&sa=X&ved=2ahUKEwjZ8-L81sriAhVkxoUKHcmgDsYQ9QEwC3oECAAQGg#imgrc=bAJ-EOsvz8c3-M:

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ANNEX I.

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EXPRESS CONSENT FOR VIDEO/AUDIO RECORDING

D…… with I.D……..In the name of……

I give my consent for the music therapy sessions to be conducted by Sonia Suero Mangas with I.D. 71660453 C, are recorded and viewed for the purposes of supervision and evaluation of the music therapy process.

Mrs. Sonia Suero Mangas with I.D. 71660453 C I undertake to use the recorded data preserving as much as possible the privacy of the person, using restrictively and professionally videos in clinical fields, review, assessment, monitoring and / or research. These videos/audios will be incorporated into the image file.

The recordings will be protected by the following code of ethics:

- The video/audio session may not be used in its entirety, but only those parts that can be evaluated.

- The videos will be used for internal analysis (supervision) and/or teaching purposes.

- Video/audio recordings will only take place inside the music therapy room and during therapy.

- Video/audio recordings will be made by the researcher or music therapist.

- The music therapist will keep the video/audio information in a safe place.

- The person authorising the recording has the right to request at any time the deletion or destruction of the material by sending a registered letter to the person responsible for the file.

Signature (Parent/Guardian). Signature music therapist

In Oviedo…… 2018

ANNEX II

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INFORMATION FOR THE FAMILIES

The music therapist Sonia Suero Mangas, requests that you participate in a research study in music therapy that is being carried out in children with cancer.

In this study, it is intended to show that the usefulness of experience with music therapy in these children may have repercussions:

- Decreased pain
- Increased positive mood
- Increased motivation and self-esteem

If you choose to participate in this study, you should carefully read and voluntarily sign the informed consent form. Your signature indicates that you give us your consent to participate in this study. Even if you choose to participate, you are free to withdraw your consent and discontinue participation at any time.

The results of the study may help to better understand the positive effects that music therapy treatment has on patients with their disease.

All patient-related information is strictly confidential. Sessions may be recorded for monitoring and evaluation of the therapeutic process.

The results obtained may be used for the completion of a Master's Thesis Research, as well as published in scientific journals and / or will be presented at conferences or scientific meetings. Strict confidentiality regarding the identity of patients will be maintained in study reports, publication in journals or presentation at congresses or scientific meetings.

EXPRESS CONSENT FOR PARTICIPATION IN THE STUDY

I……
……., with I.D……..

* I understand that participation in this study is voluntary.
* understand that I can withdraw from the study at any time, without having to explain myself.
* I have been sufficiently informed about the study.

Signature Music therapist Signature family

Sonia Suero Mangas I.D. 71660453 C

ANNEX III

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MUSIC THERAPY (For families)

Music therapy is a relatively young discipline, which until recently has been considered mere entertainment, but has now established itself as a recognized component of health care due to the many articles that demonstrate its effectiveness.

The World Federation of Music Therapy (WFMT) defined it as follows (2011): "Music therapy aims to develop potentials and/or restore functions of the individual so that they can soon achieve both intra- and interpersonal integration and, as a consequence, a better quality of life through prevention, rehabilitation or treatment.

The main tool is music, and taking into account its characteristics the aspects to work with the pediatric patient can be (Del Campo, 2002)

CHARACTERISTICS OF MUSIC	ASPECTS TO WORK WITH THE PATIENT
Ability to evocate	-Decrease anxiety -Promote muscle relaxation -Decrease painful perception
Musical instruments	Expressing feelings through instruments Containing anger/aggressiveness.
Creativity	Develop self-esteem -To introduce the subject who lives a process of destruction, in a process of creation.

Ability to communicate	To provide the subject with a non-verbal language for the expression of feelings. -Psychosocial development -Decreasing isolation -Helping group participation

The main tool is music and this will consist of:

* Encouraging the active participation of the patient whenever possible: musical game
* Clinical improvisation techniques: understood not seeking aesthetic taste but as a way of communicating with the patient.
* Songwritting:
* Creating songs
* Modify lyrics or music of familiar songs
* Use other arts: painting, stories,...
* Made our own instruments
* Receptive techniques: listening to music or songs that mean something to the patient.
* Working creativity, imagination, curiosity. Freud said that creativity does not belong to geniuses, but is a capacity that any person possesses, some people develop it by themselves, and others need a guide.

According to Wigram et al. (2002), music therapy with children focuses on developing their potentials as developing people who are, rather than problems. It offers them a framework where they can express themselves with their own ideas and thus be seen, heard and valued through something they create themselves from within. Camino Bengoechea, a music therapist with the Paediatric Oncology Service at the Montepríncipe Hospital in Madrid, defends its use as it says "music therapy seeks the relationship established between music and the human being. In this process of search and encounter, the music therapist offers the appropriate space and instruments so that this relationship favours trust, security and the improvement of the expressive and communicative capacity with oneself and with the other.

When a child or adolescent uses free improvisation play to explore and give themselves safety in an unfamiliar environment, it is a threatening way to address concerns, fears and express emotions associated with them. When a child uses musical play, he uses instruments as intermediate objects (Winnicott, 1971), through which communication and unconscious material come out into the present moment (Sweeny, 2003). These intermediate objects can represent people and situations related to the child or can be used to find a sense of self in relation to others through play where the instruments "come to life".Children will find meaning in their experiences with their available resources, even when there is no communication they may think or worry about their situation. (Aasgaard & Edwards, 1999).

On the other hand, instrumental improvisation aims to express emotions in a non-verbal way through connecting with instruments, connecting with family or music therapist through instruments and improvisation, gaining control of the situation in the hospital through the selection of instruments, the different roles of leader or accompanist, indicating when to start and end, gaining mastery with the instrument and feeling connected with others. Children experience this creative freedom by determining the tempo, dynamics, rhythmic structure, and form of their musical creations (Robb, 2003).

The music therapy sessions are adapted every day to the child and/or adolescent. They are adapted from the point of view of their duration, between 15 minutes and one hour, until what to do on the day of the session, whether to calm anxiety, stress and/or fear before a test, operation, treat the pain resulting from the treatment or operation, medical test, relaxation, mood changes, etc., that is, starting from the needs of the patient on the day of the session and their musical tastes.

The sessions are preferably individual, although joint sessions can be given if the different ones agree, a priori in the rooms of the Ianata where I go with different instruments: piano, guitar and various percussion instruments, as well as computer if necessary.

ANNEX IV. WONG-BAKER SCALE FOR PAIN

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¿EVALUACION OBJETIVA DEL DOLOR?(7)

ESCALA DE CARAS DE DOLOR DE WONG-BAKER: Niños, incluido edad pre-escolar

ANNEX V. EVEA SCALE FOR CHILDREN (MOOD)

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EVEA

A continuación encontrarás una serie de frases que describen diferentes clases de sentimientos y estados de ánimo, y al lado unas escalas de 10 puntos. Lee cada frase y rodea con un círculo el valor de 0 a 10 que indique mejor cómo te SIENTES AHORA MISMO, en este momento. No emplees demasiado tiempo en cada frase y para cada una de ellas elige una respuesta.

Me siento alegre |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Me siento triste |-------|-------|-------|-------|-------|-------|------|-------|-------|----|
0 1 2 3 4 5 6 7 8 9 10

Me siento enfadado |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Siento que tengo miedo |-----|-----|-----|-----|-----|-----|----|-----|-----|------|
0 1 2 3 4 5 6 7 8 9 10

ANNEX VI. EVEA FOR FAMILIES AND NURSES (MOOD)

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EVEA

A continuación encontrarás una serie de frases que describen diferentes clases de sentimientos y estados de ánimo, y al lado unas escalas de 10 puntos. Lee cada frase y rodea con un círculo el valor de 0 a 10 que indique mejor cómo te SIENTES AHORA MISMO, en este momento. No emplees demasiado tiempo en cada frase y para cada una de ellas elige una respuesta.

Me siento nervioso |-------|-------|-------|-------|-------|-------|------|-------|-------|----|
0 1 2 3 4 5 6 7 8 9 10

Me siento irritado |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Me siento alegre |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Me siento melancólico |-------|-------|-------|-------|-------|-------|------|-------|-------|----|
0 1 2 3 4 5 6 7 8 9 10

Me siento tenso |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Me siento optimista |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Me siento alicaído |------|-------|-------|-------|-------|-------|------|-------|-------|------|
0 1 2 3 4 5 6 7 8 9 10

Me siento enojado |-------|-------|-------|-------|-------|-------|------|-------|-------|------|
0 1 2 3 4 5 6 7 8 9 10

Me siento ansioso |-------|-------|-------|-------|-------|-------|------|-------|-------|------|
0 1 2 3 4 5 6 7 8 9 10

Me siento apagado |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Me siento molesto |-------|-------|-------|-------|-------|-------|------|-------|-------|------|
0 1 2 3 4 5 6 7 8 9 10

Me siento jovial |-------|-------|-------|-------|-------|-------|------|-------|-------|------|
0 1 2 3 4 5 6 7 8 9 10

Me siento intranquilo |-------|-------|-------|-------|-------|-------|------|-------|-------|------|
0 1 2 3 4 5 6 7 8 9 10

Me siento enfadado |-------|-------|-------|-------|-------|-------|------|-------|-------|-----|
0 1 2 3 4 5 6 7 8 9 10

Me siento contento |-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
0 1 2 3 4 5 6 7 8 9 10

Me siento triste |-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
0 1 2 3 4 5 6 7 8 9 10

FECHA **FIRMA**