Can arts-based interventions reduce children's peri-operative anxiety in paediatrics? A discussion of representative studies

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This is the author's accepted manuscript of the article published as: Maagerø, L.H., Grainger, C. and Sextou, P.2. 'Can arts-based interventions reduce children's peri-operative anxiety in paediatrics? A discussion of representative studies', *Applied Theatre Research,* 11(2), pp. 141-154. doi: 10.1386/atr_00081_1.

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Abstract

This narrative literature review aims to provide a broad scope and objective analysis, by identifying and summarising published works surrounding the current research into how different forms of non-pharmaceutical and non-invasive arts-based methods can be used to reduce children's peri-operative anxiety in paediatrics. Whilst our search focuses on the peri-operative anxiety context, we build on wider research on the role of the arts in paediatrics and include representative studies from the last five-to-seven years. Our aims are to highlight the most current findings in non-invasive interventions for hospitalized children, including primarily applied theatre performance in paediatrics followed by digital arts such as video games, virtual reality ((VR), hereafter) and music. Through this, we aim to gain a better understanding of the current knowledge of how the arts as non-pharmaceutical and non-invasive arts-based methods can be further utilized in surgical procedures and treatments in paediatrics, how arts practitioners and hospital staff can better collaborate in such procedures, and what further research is needed in relation to such methods for reducing peri-operative anxiety in children.

Background

Hospitals are places that evoke adverse responses associated with the clinical stressors that children experience during their stay (Pelander & Leino-Kilpi, 2010). During hospitalization and when going through surgery, children experience several situations and clinical stressors that may cause situational anxiety, negatively impacting their wellbeing. Clinical stressors can include unfamiliar environments, separation from parents/carers, a loss of normality, routine, and privacy, interactions with medical staff and undergoing procedures, anticipation of clinical test results, fear of death and long-term stays (Sextou, 2016). It is well documented that if children's pre-operative anxiety is poorly managed, it can cause increased distress, lead to complications during the induction of anaesthesia and hinder recovery in the post-operative period (Teruel et al., 2021). Although children are expected to behave as co-operative patients, what is less often expected is to behave as creative and playful participants in hospitals. The identity of being a child is replaced with the identity of the ill child, which decreases the potential of a positive hospital experience. Accordingly, despite the best efforts of hospital staff, children often find the experience frightening and painful. Whilst medical interventions to help control peri-operative anxiety exist, medication is not necessarily the most cost-effective or efficient solution (Cuzzocrea et al., 2013), and it is not always advisable to administer additional medication to children before the induction of anaesthesia. Arguments have subsequently been proposed to investigate non-pharmaceutical and non-invasive solutions to reduce peri-operative anxiety (pre- and post-procedure) in children.

One such way of improving children's wellbeing in healthcare contexts is the arts. The arts are acquainted with how we experience the world around us: the beauty and the ugliness, the wellness and the illness, the ability and the disability, the ephemeral and the internal, the playful and the painful, the sublime and the elegant, the identity of 'I can do' and the identity of 'I cannot do anymore'. In all these phenomena we believe that similar principles are operative and that similar interests are engaged. Recently, James Thompson (2023) has developed the concept 'aesthetics of care' to suggest that thinking about care work through an aesthetic lens might be a way to promote affective solidarity and avoid a 'careless society'. Thompson's approach to

aesthetics examines socially engaged arts and health and social care through participatory and applied arts. Then it argues for artful care and how an aesthetic orientation to care practices might challenge some of the inadequacies of contemporary care. The positive role that different artforms can play in healthcare settings have been thoroughly documented. The arts can make a positive difference in the ways children experience medical treatments and environments by the employment of creativity, imagination, sensitivity to children's priorities and abilities, and ethical approaches to their needs, feelings and emotions (Sextou, 2023). As Kharrati et al. (2019) argues, art is the common and familiar language in all cultures. Using the language of art is a safe method that has positive psychological effects. Establishing effective communication and mitigating the psychological effects of the hospital environment can improve the psychological health of patients (Kharrati et al., 2019). The arts have been used in different areas of healthcare, including paediatrics. However, the benefits of the arts, including embodied and mediated performance and digital arts in reducing peri-operative anxiety in children is under-researched. This narrative literature review aims to contribute by giving an up-to-date overview of what has been achieved in this field so far. Through this we also hope to point out some important directions for further research. The review's focus is on studies that we have retrieved from the last five-to-seven years, although we also build on, and refer to, previously published research. We aim to highlight the most current findings in this area of research and, as Bray et al. (2022) suggests, to further understand which specific elements of the non-invasive interventions that 'work best' for children. Through this, we also hope to provide an insight in to how non-pharmaceutical and non-invasive, arts-based methods can be further utilized in surgical procedures in hospitals, how arts practitioners and hospital staff can better collaborate in such procedures, and what further research is needed in relation to such methods for reducing peri-operative anxiety in children.

We decided to focus our attention on four main categories or art forms: theatre performance, videos/video games, virtual reality (VR) technology, and music. The choice of these categories was made after initial database searches led to the most findings relating to these specific areas. The same process led us to single out VR as a separate category from video/video games because in recent years, there has been a significant surge in studies of the use of VR in healthcare, including in relation to paediatric surgery, and we therefore saw it as useful to discuss this as a separate category.

The research methodology consisted of searches of computerised databases, conducted primarily through Pubmed, Science Direct and Google Scholar using keywords search terms, including 'pre'-, 'peri'- and 'post-operative anxiety', as well as 'children', in addition to the four art categories chosen. For some art forms, we included subcategory search terms, i.e., we used words such as 'theatre', 'performance', 'drama', 'puppetry' and 'clowning' to cover the wider field of theatre and performance. We singled out the studies that focused on children (under the age of 18) and paediatrics and that were published in the last 5-7 years. For this narrative overview of the literature the included studies, as representative examples of practice, were categorized and compared for different characteristics, such as research methods, number of participants and results/conclusions. This categorisation led to a discussion of the existing research in relation to each of the four categories outlined above.

Applied theatre performance

There has been research conducted in recent years on the calming and distractive effects of theatre on children in hospital and the benefits of bedside synergistic performance using puppetry and storytelling beyond entertainment. Sextou's work has been documented in several articles and in her books *Theatre for Children in Hospital. The Gift of Compassion* (2016) and *Applied Theatre in Paediatrics. Children Stories and Synergies of Emotions* (2023). Findings show that one-to-one participatory performance with children in hospital settings led to significantly less clinical-related stress and a positive hospital experience by having a relaxing, soothing and educational effect on children. Not only can applied theatre practice normalize children's hospitalization by putting them at the centre of the artistic activity, but it also helps them gain better ownership and control of their clinical experiences and an authorship of the stories they tell about their experiences of illness, worries, and hope. Through audience participation, creativity, imagination, story-making/telling, embodied and mediated performance, animation, toy-based digital assets and improvisatory play with objects and puppets, the arts can improve the normalization of the hospital experience (Sextou, 2022). The stories children tell during bedside live performance inspired by animation films, prove that 'participatory practice can curve time and space for children to express emotions safely in the fictional frame' (Sextou, 2023, p53).

We cannot ignore the complexity of managing emotions in paediatric settings. Evidence has shown that patients express levels of care towards puppets that are animating, and they share emotions with the puppeteers, emphasising with the puppets and wanting to care for them, as well as using the puppet as a medium of expressing fantasies, fears and hopes (Astles, 2020). Kostak et al. (2021) studied the effectiveness of finger puppets in reducing pre-operative fear in a randomized controlled trial. Children and parents in the intervention group were engaged in finger puppet play during preparation for surgery. Results showed that children in the intervention group scored a significantly lower fear score than children in the control group. Dehghan et al. (2016) combined studying puppetry with the study of therapeutic play. Here there were three groups of children: one group engaged in puppet play, one in therapeutic play and one received normal care. Once again, the results showed that children from the two intervention groups had lower anxiety levels, whilst the children in the control group developed higher anxiety levels.

For the use of hospital clowns in relation to anxiety around surgery, Zhang et al. (2016) did a literature review of older studies. They found eight studies, with the majority demonstrating that children's pre-operative anxiety was reduced when clowning was employed. They concluded that larger and cross-cultural studies should be conducted to determine the effectiveness of clown therapy in more detail. Unfortunately, we have only found three studies from recent years on this topic. Dionigi and Gremigni (2016) studied how a combined method of clown visits and art therapy reduced children's pre-operative anxiety, whilst Kocherov et al. (2016) studied how integrating a medical clown alongside medical staff reduced both pre-operative anxiety, post-operative pain and medical costs. Similarly, Yun et al. (2015) saw how an educational visit from a pre-operative 'clown' nurse reduced post-operative anxiety and pain. These studies suggest that pre-operative clown interventions help not only to reduce pre-operative anxiety and stress but influence the whole peri-operative experience of children.

Whilst there are comparably small amounts of existing research on how different types of performing arts can help reduce peri-operative anxiety and stress, the studies on this topic

suggest positive results. More research is needed on how different forms of performing arts can benefit children undergoing surgery.

Video and Video Games

The role of interactive video games in reducing peri-operative procedural pain and anxiety in paediatrics has been discussed in several studies. Sajeev et al. (2021) argued that introducing video games, such as distraction-based conventional video games into routine practice can minimize paediatric procedural pain and child/caregiver anxiety. The use of digital interventions in healthcare settings, such as video and video game play, have gained traction in recent years for their advantages as a non-pharmaceutical alternative in the management of pre-operative anxiety in children. Due to their safe and straightforward implementation, video and video games have been used in paediatrics to assist not only children but also nursing staff, who do not require specialized training to use such devices (Rostami et al., 2022). Tailored interventions that use video and video games with the aims of reducing pre-operative anxiety in children, have shown positive benefits to their use when used as a distraction from medical procedures and the hospital environment and as an educational tool to inform about the operative process.

Distraction via video games is a technique that is used in the aims of reducing pre-operative anxiety in children. Teruel et al. (2021) evaluated the anxiety of both children (three to 10 years old) and their parents, comparing those with and without the use of a Nintendo handheld device as a distraction during transitional stages of the procedure. Overall, the video game group was found to have significantly lower pre-operative anxiety for both child and parent but noted that the timing of distraction was an essential element in the success of reducing anxiety and that distraction at parental separation, entering the operating theatre and induction of anaesthesia proved successful in overall anxiety levels. Similarly, Patel et al. (2006) sought to evaluate the effectiveness of an interactive handheld device as means of distraction to reduce paediatric pre-operative anxiety. They found significantly reduced anxiety in the video game group, compared with controls. Patel et al. (2006) attributed this decrease in anxiety to cognitive and motor engagement through enjoyable distraction. Kato (2010) commented that an engaging distraction is key in shifting focus in the management of pain and stress.

The implementation of videos in healthcare settings have also been used for educational purposes. An early example is by Rice et al. (2008), who observed the effect of the pre-operative education programme ‘Saturday Morning Club’ (SMC). Of the 94 children (aged between two and 16 years), 21 children attended a showing of the educational programme two weeks before their procedure. The video was intended to provide the child and parent with familiarization of the hospital environment, as well as the pre-operative waiting room and suite, which also introduced basic paraphernalia. They reported that the SMC group had reduced levels of anxiety, but that statistical significance was only noted in the waiting room. In a randomized control trial, Chartrand et al. (2016) investigated the effect of an educational pre-operative DVD designed to inform parents on the best practices to support their child in the recovery room after surgery. Compared with controls, parents in the intervention group learned greater positive reinforcement and distraction techniques which, in turn, lowered the child’s post-operative pain. The educational video was not enough, however, to significantly reduce anxiety levels. In comparison, a randomized control trial by Härter et al. (2021) designed a child-friendly educational video to reduce pre-operative anxiety on the day of surgery. The intervention group were shown explanations of pre-operative procedures in addition to standard information from

nursing staff. Interestingly, results showed that both intervention and control group displayed significantly reduced anxiety, however, no differences in anxiety were found between groups. Reasons for this could be attributed to the age range of participants (six to 17 years) and the age appropriateness and developmental content of the video. Again, it was also noted how crucial timing was in the intervention of such digital tools. A randomized clinical trial by Liguori et al. (2016) was used to test the effectiveness of an educational video app 'Clickamico' on a tablet device to reduce pre-operative anxiety in children. Unlike the previous studies mentioned, the purpose of the video was to provide an informative tour of the operating room in a comical way, given by clown physicians. Using a fun approach to medical procedures resulted in a reduced level of anxiety, compared with controls.

Dwairej et al. (2019) conducted a study for children (aged 5-11 years) combining video game distraction and anaesthesia mask practice, through exposure and shaping. This resulted in a reduction in pre-operative anxiety in the intervention group compared with controls when being transferred to the operating theatre, at induction phase and at post-intervention. Moreover, children in the intervention group were also more compliant and accepting during anaesthesia mask induction. Winterburg et al. (2022) developed the notion of video game distraction one step further by designing a breath-controlled induction app. The concept is an interactive adventure video game where Winterburg et al. (2022) cleverly incorporates anaesthesia mask exposure as part of the game. Children (aged 4-10 years) breathe slowly through the mask which inflates the balloons in the game to progress. No anaesthesia is given during this pre-operative phase. The children not only become familiarized with the mask, through practice and exposure, but also present less anxiety around the paraphernalia, displaying calmer, controlled breathing. During the induction phase of the game, the mask is connected to the anaesthesia as the child continues to focus on playing the game as in the pre-operative phase, breathing slowly as they drift off to sleep.

Videos and games for educational purposes demonstrate the cost-effective and portable nature of implementing such interventions in healthcare settings, and further research should be conducted into how this can be utilized more broadly in healthcare systems in the UK and abroad.

VR Technology

VR is used to describe digital technology that allows individuals to interact with an artificial three-dimensional (3D) visual or another sensory environment, usually with a VR headset (Lowood, 2022). It is different from traditional video gaming where the user is watching the virtual world on a screen, and AR (augmented reality) which uses digital technology to 'add' to reality by projecting on top of what the user already sees (Hosch, 2022).

The last five years have seen several studies in which VR technology has been utilized in paediatrics. VR technology has mainly been introduced as a means of distraction to overcome pain, fear, and anxiety in several areas of paediatric treatment in health and palliative care contexts. Wang et al. (2018) conducted a literature review in the field of needle phobia, and found that VR interventions, in many cases, reduce the pain, fear and anxiety experienced by children in relation to needles. Other medical fields include burn treatments (Ali et al., 2022; Le May et al., 2021) and oncology (Tennant et al., 2020). Balfour et al. (2022) differs from other studies of the use of VR in paediatrics, in that it does not focus on VR as a means of distraction but rather as a tool for co-design and co-production with young inpatients in palliative care in Australia. The participants were invited to co-design VR environments based on their knowledge, interests, and desires of visiting places they knew (the village where they grew up) or places as creations of their imagination (to travel to the moon). The VR experiences were subsequently shared with family and hospital staff, creating a sense of agency and empowerment for the hospitalized children. This process helped reduce stress for the participants in the hospital environment and gave them a greater ownership of their treatment processes.

Within the wider context of immersive technologies in human-centred activities in paediatrics, some studies are specifically related to utilising VR as an intervention to combat children's anxiety in relation to surgical procedures. As with video/video games, these can mainly be divided into two categories: those that use VR as a means of distraction where the VR world explores non-medical settings, and those that use the VR experience to introduce and educate patients and carers to the surgical procedures. Of these, there are more studies of the use of VR as an educational tool. In such interventions, patients are usually given a virtual tour of the procedural processes using VR technology. The focus can be on a single medical procedure, such as in a study by Stunden et al. (2021) who provided an educational VR experience of an MRI-scan, or of the whole surgical process from check-in at the hospital to post-operative care, such as the study that was undertaken by Willer at Nationwide Children's Hospital in Columbus, Ohio (2022). In some cases, the educational VR experience includes child friendly characters and an element of storytelling and game playing. Gold et al. (2021) let children be 'a doctor for a day' with the character Doc McStuffins, whilst Ryu et al. (2018) developed a game where children were encouraged by famous Korean cartoon characters, Chatan and Ace, to fight the 'germ monster' in the operation theatre. Most of these studies conclude that using VR experiences to introduce children and carers to surgical procedures can reduce pre-operative anxiety, but do not necessarily influence the children's behaviour during and after the operation.

Not all studies that create imagined VR worlds portray medical settings. Jung et al. (2020) used a VR experience of an animal moving through a landscape as a means of distraction during the anaesthesia process. Children watched the animal, whilst also being able to communicate with hospital staff and carers. The study concluded that the VR experience did reduce pre-operative anxiety, but that there were no post-operative effects. Olbrecht et al. (2021) used VR to reduce post-operative anxiety and pain. Here, VR was used to introduce children to relaxation exercises, where they were taken to 'an alpine meadow in the virtual world, where a 10-minute relaxation narrative [taught] focused, slow, and paced breathing' (Olbrecht et al., 2021, p. 3). The study concluded that relaxation techniques through VR did reduce pain and anxiety to a certain extent, but that the effects were mainly present during and straight after the intervention, with fewer long-term effects.

The research around VR as a tool for combatting pre-, peri- and post-operative anxiety in children demonstrate the benefits when used as an educational tool and in other types of VR intervention. However, evidence seems to suggest that whilst patients feel less anxiety at the time of intervention, results are short-lived. More research is required to determine how VR technology can reach its full potential for reducing peri-operative anxiety in children longer-term as a non-invasive tool to combat peri-operative anxiety in paediatrics.

Music

Music's natural ability to reduce sympathetic nervous activity leads to a reduction of anxiety and stress levels, which ultimately changes the physiological and emotional states of patients in hospital (Jia et al., 2016). Therefore, it is unsurprising that music interventions are commonly used as non-pharmaceutical alternatives to reduce pre-operative anxiety in children. In addition to its calming properties, music can also be used as a distraction from anxiety, stress, and the hospital environment (Aitken et al., 2002). Music interventions for reducing pre-operative anxiety in children either take a passive (music listening) or active (live music) approach (van der Heijden et al., 2015).

Franzoi et al. (2016) found that 15 minutes of music listening was statistically significant in reducing pre-operative anxiety in children undergoing elective surgery, in addition to improving emotional expression, vocalisation and behavioural states. Kharrati et al. (2019) investigated the effect of songs sung to children about pre- and post-operative procedures, before, on the day of, and after surgery to reduce anxiety of children undergoing tonsillectomy. Results showed that the intervention group experienced significantly reduced anxiety compared with controls, for songs sung to children on the day of surgery. Using singing to create a relaxed atmosphere in the hospital setting on the day of surgery, may have subconsciously evoked positive associations in undergoing medical procedures (Kharrati et al., 2019). In a study by Millett and Gooding (2017), they set out to determine the effectiveness of both passive and active distraction-based music therapy interventions to reduce pre-operative anxiety in children and their parents. Forty children were randomly assigned to either the passive or active intervention. Results found that both music interventions were significant in reducing pre-operative anxiety in both the child (assessed using the modified Yale Pre-operative Anxiety Scale) and their parents (measured through self-report form; Strait-Trait Anxiety Inventory-Y6) and that both intervention types were equally as effective as the other. Giordano et al. (2020) evaluated the influence of music on pre-operative anxiety in children undergoing invasive procedures to treat leukaemia. Children were assigned to either the music group or standard care group. The music group consisted of 15–20-minute bedside music sessions before surgery. Children were given the option of both passive and active techniques such as listening to music, singing songs/song writing or involving the use musical instruments. Overall, pre-operative anxiety in the music group was reduced compared with the standard care group.

Whilst it is evident that music has the capability to reduce peri-operative anxiety in children, as seen from the abovementioned studies, further research needs to be conducted into finding the most efficient and cost-effective solutions for implementing such interventions in the wider hospital context. For example, active music approaches often require music therapists to attend sessions with children in hospital, however the cost and practical implications of this may deter its use in favour of passive music interventions that can be easily implemented by nursing staff without the use of additional training. Despite the success in using passive music interventions to reduce pre-operative anxiety in children, research needs to explore ways to apply active music

interventions more sustainably in this setting. For instance, music sessions via the use of digital technology could be explored as a way of engaging the child in active music-making with the therapist online.

Concluding thoughts

This article traces clear synergies between the arts, performance, technologies and research into the improvement of hospitalization and provides findings in which the arts and healthcare do and can work more systematically together to employ the arts as non-medical tools to care for children in healthcare settings. The findings of this narrative literature review have shown that the arts, as a powerful practice and creative medium, can offer distractive and educative tools to reduce children's peri-operative anxiety. Synergistic products of audience imagination, participation with puppets and objects, digital technologies, sounds and movement, and exchanges of stories and emotions in paediatrics could allow for future investigations into the communications between artists, children, families and hospital staff. In turn, this may help contribute to the normalization of the hospital experience and the reduction of clinical stressors before a child is admitted to the hospital, during and after their treatment. The presence of the arts – as a non-clinical intervention – in healthcare alongside a child experiencing clinical anxiety, as a non-clinical presence, can reduce distress and complement medical approaches.

This article demonstrates that the research currently being conducted into non-pharmaceutical and non-invasive arts-based methods for supporting children in dealing with peri-operative anxiety show positive findings. Evidence has shown that such methods not only reduce clinical anxiety but also benefit children through the whole surgical process, as well as improve and normalize children's hospital experiences. This is the case for both passive and active arts-based embodied and imagined experiences, and activities that distract, relax, and engage children in hospital. Thus, it seems clear that more non-pharmaceutical and non-invasive arts-based methods should be implemented in greater capacity as part of operative procedures in paediatric healthcare and palliative care.

However, most of the studies we have encountered are relatively small in terms of sample size (none of the studies included more than 100 children). We, therefore, suggest that whilst different forms of art are used in operative procedures in paediatrics (video and video games, VR, music, theatre, and performance), such use is mainly on a small scale. Further research is needed in this area, and we propose that this research should be focused on the following two issues. Firstly, more studies – both large-scale studies and smaller studies with specific focus – are needed to explore how different art forms or creative combinations of them (e.g., theatre performance with digital assets, art installations and VR, AR with music, etc.,) can be utilized to their fullest potential. We know that the arts reduce children's anxiety in hospital and other healthcare settings, but we do not know how efficient art is, what art forms work best for what medical conditions, treatments, and purposes, and how the arts should be implemented in the operative procedure. When making this proposition, however, we are mindful of the limitations of participatory arts-as-research in relation to the size of samples and the challenges of securing data collection procedures in healthcare settings. Secondly, we need more research that looks at how the arts can be implemented into healthcare systems around the world as common practice and constant, government-funded provision. The studies we have encountered often describe small and short-term projects. We have seen that some hospitals now offer non-pharmaceutical and non-invasive arts-based methods to patients, but such offerings are still rare and provided on a contract-basis with cultural organisations such as theatre artists and industrial companies such

as immersive technical companies. Provision is subject to healthcare policies, priorities, budgets, affiliations and partnerships between the creative industry and healthcare systems. It is not a surprising conclusion; the creative participatory arts enhance our understanding of the hospitalized child and their emotions. The arts generate conditions for children to deal with the unexpected and scary aspects of life in a more relaxed way. Thus, we need research that looks at arts-based procedures in paediatrics more holistically and study everything from how artists and hospital staff can collaborate more fluently, to questions of funding and logistical structures. These are issues that urgently need to be addressed, so that the beneficial results demonstrated in the above-mentioned studies, can reach as many children undergoing surgery as possible for increased benefits.

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