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PLAYING WITH CHILDREN'S HEALTH?

A scoping review of recent literature on play and children's health



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FOREWORD

Starlight and PEDAL share a passion for improving children's healthcare and for the importance of play in children's lives. After our successful joint symposium in 2023, highlighting some exciting research, policy and practice developments in the field of health play provision, we wanted to explore what more we could do together to shine a light on this important area of children's healthcare. This new literature review, exploring connections between play and children's health in the context of their healthcare, is the result.

Academics, policymakers and practitioners alike agree that playing is integral to a good childhood. For children who are sick and receiving care and treatment, it can make the difference between positive and negative experiences. The UN Committee on the Rights of the Child (2013) is specific about the connection between children's rights to play and good healthcare. In the UK this is recognised by official guidance from the National Institute for Health and Care Excellence (NICE, 2021) which states that therapeutic play services can 'reduce boredom and anxiety while waiting for appointments or interventions ... (and) reduce the fear and anxiety about pain ... before, during and after interventions or procedures'.

Yet, in reality, pressures on resources and time means that too many children are deprived of play opportunities when they are in hospital or other healthcare settings, denied the support of play specialists for difficult procedures (Starlight, 2023).

This thorough review finds that play for sick children 'can profoundly influence their experience of receiving healthcare and their perception of being well amidst health adversity ... (with) the potential to mitigate long-lasting psychological effects, both for the child in the present and as they develop into the future'.

At a time when the government is building a new long term health plan that it says will include 'creating the healthiest generation of children ever' (Labour Party, 2024) we hope that the evidence presented here, of the 'humanising' effect of play on children's healthcare, will have the impact that it deserves.

Paul Ramchandani

Professor of Play in Education, Development and Learning, and the Director of the PEDAL Centre

Cathy Gilman, CEO, Starlight



EXECUTIVE SUMMARY

This scoping review explores the connection between play and children's health in healthcare contexts, synthesising 127 studies across 29 countries. Commissioned by the Starlight Children's Foundation (Starlight) and conducted by the Centre for Research in Play in Education, Development, and Learning (PEDAL) at the University of Cambridge, the review highlights the role of play in promoting children's holistic health and wellbeing in healthcare environments. In light of recent reports identifying the increasing complexity of children and young people's health needs as well as significant challenges present in healthcare systems and delivery, this report positions play as a critical element in a shift toward holistic, person-centred paediatric care. Play not only alleviates distress in medical settings but also bridges the gap between physical and psychological health, supporting emotional and social needs alongside medical treatments.

Play is essential to children's lives and health. Non-medical play—such as games, creative activities, and storytelling—can enhance emotional expression, reduce fear, and promotes social connection. Medically relevant play, such as role-play with healthcare tools, helps children prepare for medical procedures, reducing anxiety and fostering a sense of control. Play preserves a child's sense of normalcy and joy, even within the constraints of healthcare environments.

This review identifies five key domains where play contributes to health in healthcare settings:

1. reducing stress and discomfort during medical procedures
2. helping children express and manage emotions
3. fostering dignity and agency
4. building connection and belonging
5. preserving children's sense of childhood.

The evidence highlights the unique capacity of play to address the emotional and mental aspects of healthcare for children and young people, and calls attention to the evolving perception of what it means to be 'healthy' or 'well' within healthcare spaces.



This review also highlights gaps in the literature base, including a lack of research that explores the experiences and perspectives of younger children and adolescents, or children in mental health settings. Most studies focus on structured, adult-led play, with minimal exploration of child-led approaches or the impact of play professionals in healthcare environments. These gaps underscore the need for more inclusive, diverse, and child-centred research and practices to inform systemic changes to a paediatric healthcare delivery system.

The findings of this review advocate for embedding play as a reliable feature of paediatric healthcare. Play supports a preventative, holistic approach that addresses the intertwined physical, mental, and emotional dimensions of health. Integrating play into care systems can help humanise the healthcare experience and promote better outcomes for children and young people now and into the future.

INTRODUCTION

The World Health Organization (WHO) defines health as a state of complete physical, mental, and social wellbeing, not merely the absence of disease or infirmity¹. While this definition has been critiqued as idealistic or utopian, it expands the concept of health beyond the absence of illness², reflecting a holistic approach that considers multiple determinants of health arising from individual contexts and circumstances.

For children, it has been said that “being healthy is being able to play”³. From this perspective, play is more than a pastime – it is a proxy for children's health and wellbeing, offering critical insights into their physical, emotional, and social states.

In recent years, the United Kingdom has recognised a growing need and momentum toward reimagining the healthcare landscape for children and young people (CYP) with a more holistic, person-centred approach. Findings from the recent independent investigation of the National Health Service (NHS) underscore both the complexity and opportunity inherent in this challenge: rising rates of both physical and mental health issues among CYP, alongside a surge in complex, long-term conditions, put increasing demands on presently-strained healthcare facilities and specialised paediatric care⁴.

Notably, CYP report less positively about their healthcare experiences generally than older generations⁵; such challenges or gaps in service delivery and patient experience can influence enduring negative effects on young children such as fear, dysregulation, or trauma^{6,7}.

Amidst this critical juncture in paediatric healthcare, why focus on play? Attention to play in healthcare settings surged following the “Welfare of Sick Children in Hospital” report (also known as the Platt Report) published by the Ministry of Health in 1959⁸, which exposed the dire conditions children faced during hospitalisation and underscored the importance of providing a supportive environment. Additionally, the inclusion of play as a right of all children by the United Nations Convention on the Rights of the Child (Article 31)⁹ further solidified the expectation that play opportunities should be available to all children; in 2013, the UN Committee on the Rights of the Child explicitly linked play and health by clarifying children's right to play when they are sick or in need of healthcare (General Comment No. 17)¹⁰.

More recent initiatives, such as the 2021 National Institute of Care Excellence (NICE) guidelines for babies, children, and young people¹¹ and the Royal College of Paediatrics and Child Health (RCPCH)



2024 “Blueprint for Transforming Child Health Services in England”¹² affirm children’s right to play and reference the importance of play spaces and play integration in children’s healthcare assessments and interventions.

When children face early adversity regarding their health, play experiences might shift in response, but play itself does not disappear. Research regarding children’s experiences amidst illness, hospitalisation, or health challenges demonstrates the resilience and persistence of play as a force for children’s overall health and wellbeing¹³⁻¹⁵. While the nature of play may adapt in response to illness or healthcare requirements, it remains a cornerstone of children’s lives, supporting them through difficult experiences. The same is true in paediatric healthcare settings, where play has the potential to address multiple facets of children’s health and wellbeing including physical recovery, emotional resilience, and social connection^{7,16-19}.

However, despite its recognised importance, there remains considerable variability in how play is implemented and valued in healthcare settings, often influenced by hierarchical structures, resource limitations, and differing interpretations of play’s role in acute care contexts²⁰. This inconsistency is reflected in the literature: while some studies underscore the importance of play for children’s health, development, and wellbeing^{7,21}, healthcare play services remain sporadic, fragmented, and underfunded^{22,23}.

This scoping review seeks to contribute to the discourse examining the connection between play and health in healthcare settings. While previous reviews have explored specific aspects of this topic—such as therapeutic play interventions²⁴, the role of play design in hospital environments²⁵, and play for children with life-limiting conditions²⁶—a broader synthesis of recent findings is still needed. In light of the UK government’s commitment to raise the “healthiest generation of children in our history”²⁷, this review is timely, positioning play as a potentially pivotal component of child-centred healthcare policy and practice.



A SCOPING REVIEW

In early 2024, Starlight commissioned our team at PEDAL to explore the recent, relevant research on children's play and its relationship to health, wellbeing, and healthcare. The aim of this initiative was to highlight where play currently factors into the field of children's healthcare research and to thoughtfully consider how this information can be applied to the contemporary challenges, needs, and goals of paediatric healthcare provision.

To address this task, we employed a scoping review framework²⁸. Scoping reviews are used to identify and map the scope of available literature on a given topic, detailing the breadth and focus of existing evidence²⁸. They can also clarify key concepts and characteristic features, examine how research is conducted, and assess gaps in knowledge and understanding²⁹. This approach is particularly useful for examining an area when it is not yet clear what more specific questions could be valuably addressed with a precise systematic review³⁰. Further details about this procedure, including our search strategy, inclusion criteria, and review protocol, are available in Appendix A. A PRISMA flowchart can be found in Appendix B.

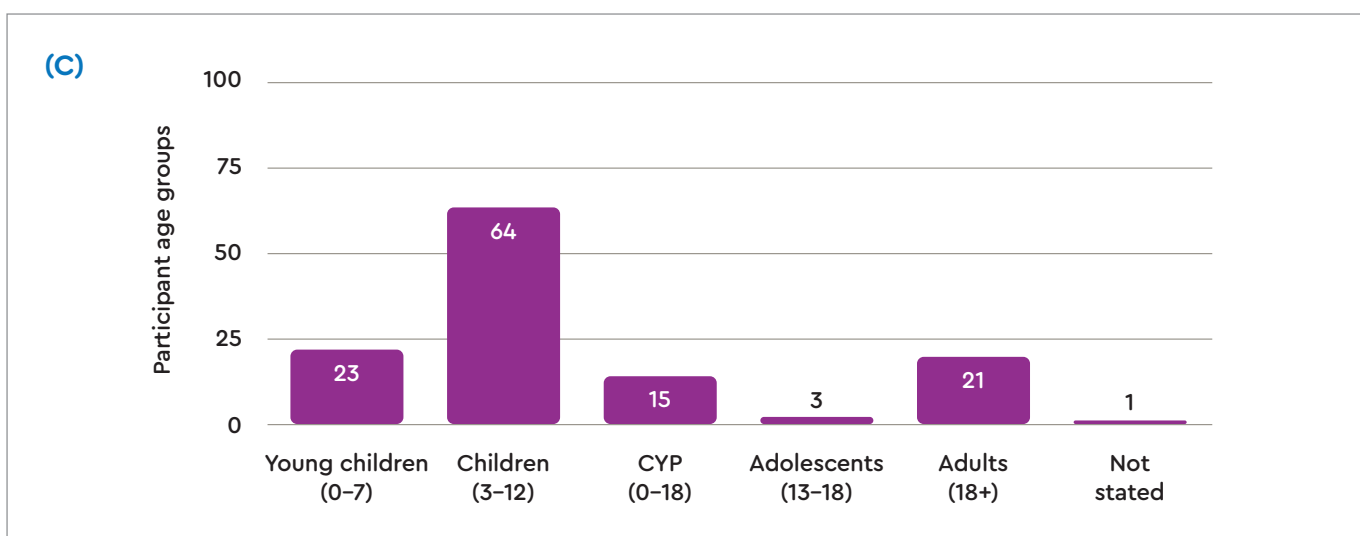
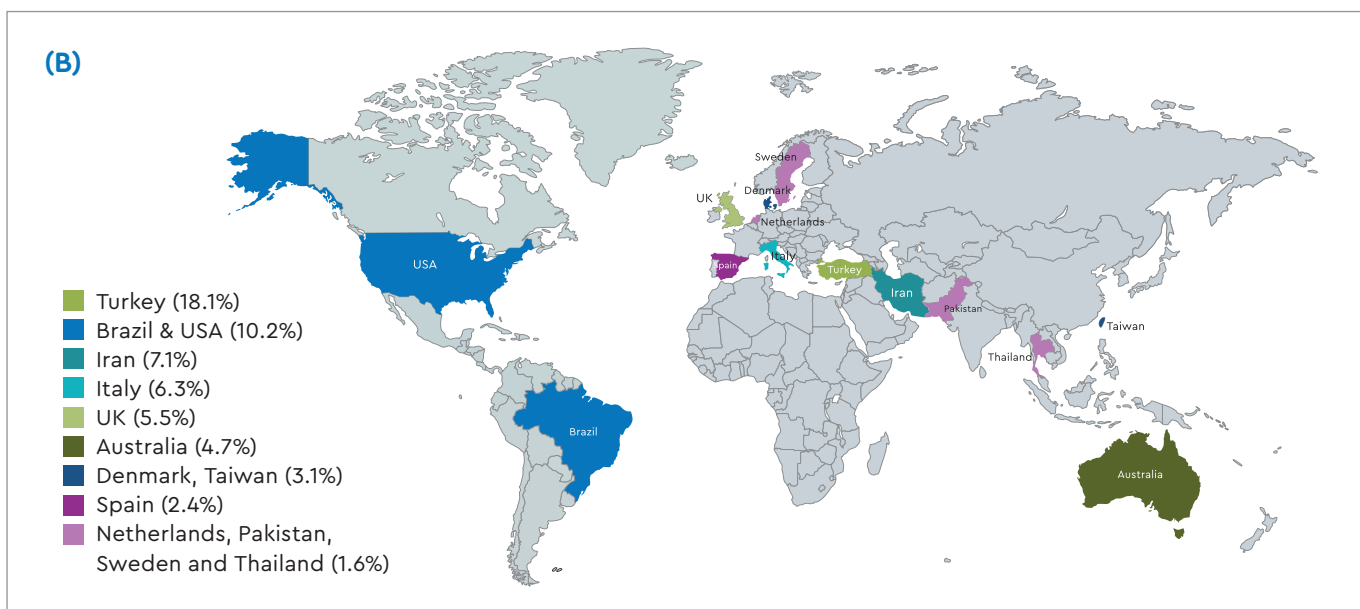
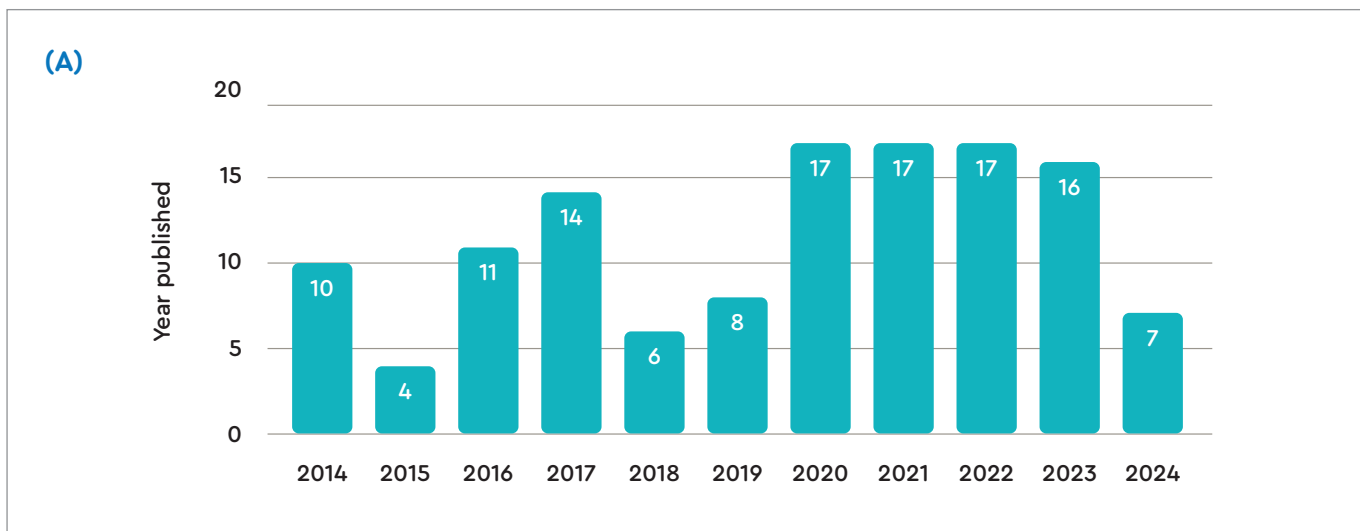
Based on the proposed focus of this review, we composed the following research question: **What does recent research reveal about the connection between play and children's health in healthcare contexts?**

In total, we identified 127 peer-reviewed research articles relevant to this research question, then assessed key ideas and knowledge gaps that could be identified from this evidence base (see Appendix C for a table of papers included in the review. Throughout the text, these papers are referenced numerically, 1-127).

Nearly 75% of articles were published after 2020, likely indicative of the increased attention toward the role of play in healthcare settings in light of circumstances such as the COVID-19 pandemic and its associated restrictions. The evidence base spans 29 countries, with Turkey contributing the highest number of studies (n=23), followed by the United States (n=13) and Brazil (n=13). Figure 1 and Table 1 provide summaries of key study characteristics.



Figure 1: Key study demographics: year of publication, study location, participant age groups



Note: Studies classified as pertaining to 'young children' were inclusive of the age range 0-7 years, but where the reported mean age was 4 years or below. Studies that included children and young people ('CYP') were those that encompassed a wide range of ages within paediatric populations.

Table 1: Key study characteristics

	N	%
Study type		
RCT	47	37%
Qualitative/Descriptive	36	28%
Quasi-experimental	28	22%
Mixed methods	7	6%
Observational/Ethnography	6	5%
Case study	3	2%
Healthcare setting		
Mental Cognitive behavioural therapy, inpatient psychiatry	3	2%
Physical General Paediatrics, Oncology, Emergency Medicine, Ophthalmology, Burn Units, Surgery, Nephrology, Rheumatology, Transplant, Urology, Intensive Care, Phlebotomy, Respiratory, Rehabilitation, Dental, Imaging, Outpatient, Endocrinology, Gastroenterology, Speech Clinics	124	98%
Types of play		
Non-medical	72	57%
Medical	35	28%
General	11	9%
Both	9	7%
Play initiators		
Adult-led play activities	56	44%
Adult led with child choice	55	43%
General	11	9%
Child-led or co-produced	5	4%
Play and healthcare experience		
Related to children's general wellbeing or healthcare experience	72	57%
Related to a specific treatment experience Blood sampling, burn care, cast removal, catheterisation, dressing changes, imaging, cannulation, needle procedures, surgical procedures	55	43%

The studies employed diverse methodological approaches, with randomised controlled trials (RCTs) representing 37% of the evidence base. These trials predominantly tested the effectiveness of specific play interventions, such as therapeutic play sessions, video games, and virtual reality (VR) activities, in influencing health outcomes compared to standard care. However, variability in the use and reporting of blinding procedures was common, with some studies acknowledging potential biases associated with single-group or unblinded randomisation. Several of these RCTs compared different types of play interventions (e.g. physical toys or games [4, 21, 43], medical play [50], video games [102]) considering qualities, such as active versus passive play, to determine which had a more profound effect on children's health and wellbeing.

Quasi-experimental designs were used in 22% of the studies, with most employing pre- and post-testing of participants receiving a play intervention. Qualitative studies accounted for 28% of papers, including exploratory and descriptive methods used to assess views and experiences regarding play and children's health. Finally, mixed-methods approaches were used in 6% of the studies. Sample sizes ranged from single case studies to large-scale studies with up to 885 participants.

Half of the papers focused on children aged 3 to 12 years. Fewer papers (18%) centred on the experiences of younger children, which we defined as those age 7 and under (where the average participant age was 4 or below). Twelve percent of studies included participants within a broader 'paediatric' age range that spanned children and young people between 0 to 18 years. Notably, only three studies directly investigated adolescents aged 13 to 18 years. Seventeen percent of papers reported on data gathered exclusively from adults who were related to or directly involved in children's healthcare, such as parents, caregivers, and healthcare professionals, all of which incorporated or entirely used qualitative, descriptive methodologies.



Types of play in healthcare settings

The type and purpose of play in healthcare varied considerably across studies. Over half (55%) of the papers examined non-medically relevant play, such as arts and crafts, social games, and free play activities. These forms of play are often employed to provide distraction, enhance emotional wellbeing, and facilitate social interactions in a healthcare context. A smaller proportion (27%) investigated clinically-oriented play, specifically designed to help children prepare for or cope with medical experiences. These activities, such as role-play or the use of medical dolls or digital tools for procedural education, are tailored to address the unique stressors of medical settings (see Table 2 for details and examples of these types of play).

A subset of studies (7%) compared medical and non medical play, analysing their differential impacts. For example, Sakizci et al. (2021 [102]) contrasted the effects of active, non-medical play (videogames) with passive, medically oriented play (watching a procedure-preparation cartoon) on preoperative anxiety. Such comparisons highlight the desire to understand types of play that are most effective for children's health outcomes, specific to context or circumstance.

Eight percent of studies examined the impact of play experiences in a healthcare setting generally, without specifying a particular type or focal point of play.

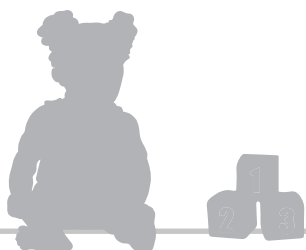


Table 2: Types of play referenced in included literature

	Types of play	Examples from studies
Non-medical play (57%)	<ul style="list-style-type: none"> • Puppets, dolls • Toys, games (stuffed animals, board games, card games, bubbles, balloons, Play-Doh®, blocks, puzzles) • Play areas • Electronic games (mobile apps, videogames) • Interactive games (image/game projectors, robots, AR/VR) • Books, storytelling • Dancing, physical activity, sport/recreation • Arts and crafts (painting, drawing, colouring, jewellery-making) • TV, films • Music (listening, playing, singing) • Medical clowns 	<ul style="list-style-type: none"> • Distraction kits: musical instruments, bubbles, puppets, magnets, teddy bear, pop-up book [6] • HabitApp: app that allows observation of animals in their own habitats [25] • Music therapy: playing instruments, singing songs, listening to music [100] • Jenga® [114, 115] • Kaleidoscope [9] • Xbox® interactive games [127]
Medically-relevant play (28%)	<ul style="list-style-type: none"> • Role play, pretend play • Books/booklets, storyboards • Storytelling, writing • Arts and crafts • Medical simulation games (mobile apps, computer games, videogames, AR/VR) • Medical equipment/doctor kits • Medical dolls, animals, toys, puppets 	<ul style="list-style-type: none"> • Playmobil® hospital toys [41] • KeTO: app that educates children about the purpose of chemotherapy, symptoms, and management through play [61] • Toy nebuliser and mask on penguin doll [63] • Virtual reality-MRI app game [107] • Medical play session with a specialist: medical equipment and doll for role play [84]

The vast majority of papers (87%) analysed the impact of play activities or interventions that were decided and implemented by adults on children's behalf, often with pre-selected, specific toys or activities. Examples include children being transported to surgery in a toy car (73), therapeutic play sessions pre-designated toys (e.g. 'pop-it' [8] or Jenga® [114,115]), or visits from medical clowns (e.g. 19, 66).

While these interventions demonstrate the utility of structured, adult-led play, they also highlight a tendency to rely on curated play activities. Half of these studies incorporated elements of child choice, allowing children to select from various toys or games, such as children being presented with various pieces of unused medical equipment and creating their own toys (109) or children choosing which videogame to play prior to preoperative anaesthesia (27), though these options were still selected by adults.

Only a minority of studies (13%) involved professionals trained explicitly in health play facilitation, such as child life specialists or health play specialists. Other play facilitators included researchers, nurses, psychologists, caregivers, allied health professionals, or volunteers.

The relatively limited involvement of play professionals and exploration of child-directed play in the healthcare research landscape could be reflective of academic publication bias toward the expertise of clinical professionals, as well as capacity and resource constraints for play professionals to engage in research³¹; still, this nevertheless belies a need to better integrate those with trained and experiential expertise into the discourse.



Types of health outcomes associated with play

The majority of studies (98%) were conducted in physical healthcare settings, as compared to only three papers (2%) conducted in mental healthcare settings. Similarly, only three studies explicitly referenced inclusion of community-based healthcare settings or professionals.

We categorised the ways in which the evidence associates play with various dimensions of children's health and wellbeing. We first considered the differentiation of physical and mental health outcomes ('mental health' encapsulating psychological, emotional, and social health), then generated higher order categorisations. These details are outlined in Table 3.

While the research on this topic tends to centre around children with physical healthcare needs in hospitals and clinics, the evidence highlights a significant focus on children's mental and psychological health outcomes. In total, 86% of the papers examined the impact of play on children's psychological or mental health, while 34% looked at physical health outcomes. These categorisations were not mutually exclusive in all instances: some studies assessed ways that play affected elements of both physical and mental health, reflecting the way in which play encapsulates a broader conceptualisation of children's health.

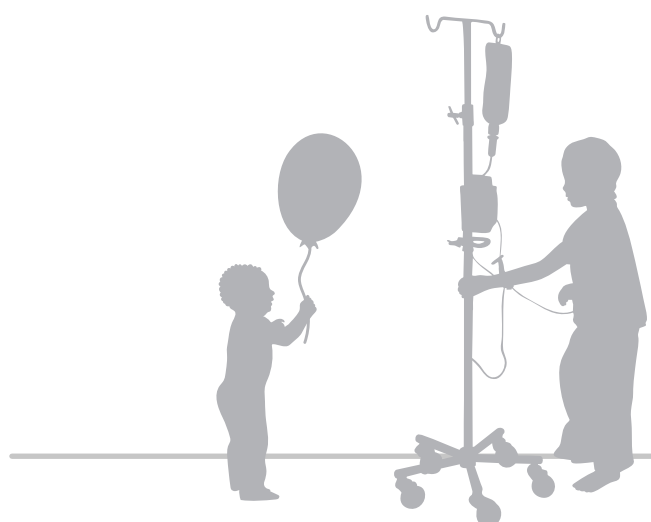
The most commonly explored health outcomes were anxiety reduction, followed by pain relief, mood improvement, and enhanced quality of life or wellbeing. Papers addressing children's mental health in healthcare settings emphasised the role of play in alleviating negative psychological experiences, enhancing preparedness and understanding of medical treatments, and fostering resilience, agency, relational connections, and overall psychological wellbeing. For instance, Navitha et al. (2023 [86]) reported that a family-centred art intervention delivered to young children in the early days of their hospital admission significantly reduced general anxiety.

Papers that focused on children's physical health outcomes explored how play reduced adverse treatment experiences, improved physical or physiological outcomes, and supported children's physical functioning and health-related quality of life (HRQoL). Maru et al. (2023 [77]) provided evidence of this by showing that a medically-relevant online game about dentistry reduced young children's heart rates during dental procedures, indicating greater preparedness and reduced stress.

Table 3: Health outcome categorisations

Mental Health	
Health factors	Thematic categories
Anxiety Fear Distress Stress, tension Negative affect	Alleviating negative psychological experiences
Knowledge Understanding Distraction	Enhancing preparedness and understanding
Calm, relaxation Relief, respite Comfort Coping Emotional expression Normalcy	Resilience
Confidence Empowerment Self-esteem Accomplishment Control	Agency
Relationships Participation, involvement Socialisation Connection Communication Support	Relational connection
Fun, joy, happiness, Engagement, activation Mood improvement Positive affect Quality of life, wellbeing	Psychological wellbeing

Physical Health	
Health factors	Thematic categories
Emergency distress Medication administration Treatment/operating time Procedural compliance Medication/sedation relief	Reducing adverse treatment experiences
Blood pressure, heart rate Physiological markers (oxytocin, cortisol) Fatigue, sleep Wound healing Pain relief	Improving physical or physiological outcomes
Child development Physical activity/functioning HRQoL	Supporting children's physical development and functioning



Key domains of the influence of play on children's health during healthcare

The evidence generated from this review can be organised across five domains illustrating how play contributes to children's health in healthcare settings: (1) reducing stress and discomfort during medical procedures, (2) helping children express and manage emotions, (3) fostering dignity and agency, (4) building connection and belonging, and (5) preserving children's sense of childhood. Below, findings are presented within these key areas.

Key area 1: Reducing stress and discomfort during medical procedures

The evidence base prominently highlights play's ability to alleviate stress and discomfort associated with procedures and treatments, enabling children to receive necessary healthcare with reduced emotional and physical distress. Play is positioned as a targeted intervention for managing the medical aspects of children's healthcare encounters. Several studies demonstrated that play interventions positively impacted children's physiological and psychological responses, including reductions in heart rate (9, 77), blood pressure (50), and distress following emergence from anaesthesia (52). In procedural contexts, play also enhances children's compliance (24, 72).

Play, especially therapeutic play, is often recognised as an effective means of reducing children's pain and anxiety surrounding medical procedures^{32,33} a finding supported by papers included in this review. Several studies referenced the connection between play and pain alleviation via therapeutic play sessions (83, 89, 112) or distracting interactive virtual reality (56, 93, 122), as well as more generalised play methods such as sessions with medical clowns (69), toys (124), or storytelling (16). These approaches illustrate the ways in which broadly applicable play methods can be adapted to individual circumstances, needs, and contexts for children's unique medical experiences.

Beyond procedural pain and discomfort, play has proven instrumental in reducing children's anxiety surrounding medical treatments. Anxiety reduction was the most frequently assessed outcome in this review, with studies demonstrating the efficacy of various interventions, including medical toys (50, 63, 90), interactive or online games (15, 17, 122), and social games or crafting activities (8, 43, 114). Qualitative findings further highlighted that play helps mitigate psychological stressors like fear and negative emotions (19, 93) while enhancing children's knowledge of medical procedures (35, 126).

Interestingly, several studies described partial effects whereby play had a temporary, but not lasting, impact on children's health in the context of procedures or treatment. Longobardi et al. (2019 [75]) reported reduced anxiety and pain before a

medical examination, but not after the examination. Similarly, Matthyssens et al. (2020 [78]) found that children experienced decreased anxiety immediately after play, but the effect was not sustained at other timepoints surrounding surgery. In some cases, play was found to influence certain aspects of children's health and wellbeing around their medical treatments, but not others. For example, a study examining interactive VR play during chemotherapy found that while the intervention increased happiness and reduced anxiety, it did not affect physiological markers such as children's heart rate or blood pressure (39). While much of children's healthcare experiences are centred around individual procedures or medical encounters throughout their treatment, these findings are a reminder of the importance of play needing to be integrated throughout their entire healthcare experience.

Key area 2: Helping children express and manage emotions

Beyond specific treatments or procedures, the evidence demonstrates how play helps shape children's broader healthcare experiences and addresses children's mental health and wellbeing alongside their physical healthcare. Healthcare settings can often be sources of stress, not only due to medical interventions, but also from the emotional toll of waiting, boredom, loneliness, or discomfort³⁴. Findings from this scoping review suggest that play combats these challenges by promoting a sense of calm, relief, or respite, while also fostering children's capacity for coping and emotional expression (32, 98, 105).

Research by Di Riso et al. (2020 [36]) shows that pretend play provided young children with a comfortable outlet to express both positive and negative emotions about their health and healthcare. The study from Kleye et al. (2021 [64]), one of few highlighting children's perspectives and self-directed play experiences, found that children as young as four identified playful resources and playful aspects of their care as primary ways to cope with hospitalisation. Importantly, studies conducted with adolescents also reported that playful interventions, such as clown doctors (79) or music therapy (96), improved and elevated young people's moods during their inpatient stays. Data



from these studies reinforce that play opportunities are essential for supporting children's mental health⁷, promoting ways of adapting and coping within the parameters of a healthcare environment.

Interestingly, exploring the link between play and emotional expression as a factor in supporting children's mental health was internationally consistent. Studies highlighting this important aspect of children's wellbeing came from a wide range of countries, including Brazil (106), the USA (120), Taiwan (122), the UK (13), Ghana (33), Spain (100), Italy (36), Denmark (65), Canada (96), and Thailand (117). This breadth reflects the universality of play in supporting children's emotional health throughout their entire healthcare experience.

Key area 3: Fostering dignity and agency

A group of papers referred to play contributing to children's sense of empowerment and autonomy, as well as their active involvement in their healthcare. Children's participation is not only a fundamental right (UNCRC Article 12)⁹ but also a pathway to promoting their health and wellbeing³⁵. Because play is best understood and expressed by the player themselves³⁶, it therefore presents a unique opportunity for children to have moments of being in control, building their confidence, and being personally engaged in a setting where choices and independence are often limited³⁷. Bray et al. (2020 [15]) observed that children who engaged in a play-

based digital interventions felt more involved and knowledgeable about their medical procedures than those who received standard care. Enhanced engagement empowers children to participate actively in matters that affect their lives and health, fostering a sense of dignity and personhood — key contributors to mental and emotional wellbeing.

Additional research highlights how play enables children to reclaim a sense of control in situations where they might otherwise feel powerless (70). Play engagement can bring about opportunities for feelings of accomplishment and active engagement (76), contributing to children's overall sense of dignity and ownership over their experiences. Studies on the impact of medical clowns or health play specialists report that play promotes children's empowerment (42, 88, 94), bolstering resilience and positive self-esteem in a setting that tends to emphasise children's vulnerability and dependency.

It is notable, however, that much of the existing evidence on children's agency through play in healthcare settings stems from adult-based reports or observations, rather than direct accounts from children. This reliance on adult perspectives introduces potential biases in interpreting the extent to which play is perceived as contributing to children's health and wellbeing. Despite this limitation, the collated evidence suggests that play can support children's dignity, control, and confidence, affirming its role in promoting holistic health within healthcare settings.

Key area 4: Building connection and belonging

Play is also a key contributor to facilitating connection and relationships within healthcare environments, which can be an isolating and overwhelming experience. Research in this review emphasises that a sense of belonging and relational trust, which are foundational aspects of mental health, are often facilitated through play. Play enables children to feel seen and supported, building social connections that help alleviate feelings of loneliness and vulnerability during their healthcare experiences.

Marques de Rosa et al. (2022 [76]) argue that play is an effective medium for strengthening relationships within healthcare settings, as it introduces moments of humour, fun, and shared experience. These shared moments can create or reinforce connections between children and their peers, family members, and healthcare professionals, fostering internal support networks that help children feel included and welcome in an otherwise unfamiliar environment. Feeling included and welcome is essential to children's psychological and social health, allowing them to navigate the complexities of healthcare with greater resilience and comfort.

Several studies demonstrate how play encourages participation, communication, and collaboration, helping children establish meaningful relationships within the healthcare setting. Whether through interactive play with peers (116) or collaborative play with families and staff (60, 120), research shows that play can cultivate social connection and sense of belonging in an otherwise strange and uncertain space. Crane et al. (2018 [28]) describe the critical importance of such connections for children in palliative care, suggesting that play builds bonds even in end-of-life circumstances, offering holistic support for children's broader psychological and mental health when physical interventions are limited.

Some studies did acknowledge that play interventions were not necessarily effective in terms of children's socialisation and connection. For example, Hsieh et al. (2016 [55]) noted that interactive games on an oncology ward did not significantly impact children's psychosocial wellbeing. Gillard (2019 [45]) found that a play-based recreation programme was well received by children, but few reported any changes to their social engagement. These findings illustrate that while play can facilitate connection and belonging for many, its effectiveness may vary depending on individual preferences, social dynamics, and the healthcare context.

Key area 5: Preserving children's sense of childhood

Play serves a vital role in enabling children to retain a sense of self beyond their identity as patients, helping them experience elements of childhood even amidst the constraints of essential healthcare. Medical environments often impose rigid routines and regulations that can overshadow the typical or expected joys of childhood. In such settings, opportunities for play provide essential moments of happiness, respite, and emotional release.

Studies in this review underscore the significant impact of play on improving mood and enhancing children's quality of life in healthcare settings. Play provides moments of joy, calm, and comfort, enabling children to experience positive emotions even amidst challenging medical situations (e.g., 13, 18, 33, 49, 118). Research suggests that these moments of positivity are not necessarily fleeting: by supporting a sense of normalcy, play helps children engage in activities that promote their continued physical and emotional development, as well as their overall wellbeing and quality of life (30, 85).

Play is deeply connected to child development, offering children vital opportunities for physical activity, cognitive engagement, and social interaction. Through play, children remain active participants in their own growth, a particularly crucial factor in healthcare settings where routines can often be regimented and focused on therapeutic intervention or treatment. As a result, play contributes to children's health-related quality of life (62, 119) and psychological wellbeing (40, 110, 113), promoting both immediate and lasting benefits to their development and sense of vitality.

However, Götte et al. (2014 [49]) also observed that while many children and young people found joy in hospital-based recreation programs that offered free play and games, some found these experiences stressful or unenjoyable. This finding highlights the importance of respecting each child's individual preferences and capabilities, ensuring that play remains a source of support rather than additional stress. Just as children's play preferences would be nurtured outside of healthcare spaces, their voices and choices regarding play should be respected within these environments to ensure that play remains a supportive and empowering experience.

DISCUSSION

This scoping review set out to explore the connection between play and children's health within healthcare contexts, synthesising findings from 127 studies across 29 countries. The review underscores a growing and widespread recognition of play as a fundamental component of paediatric healthcare, offering benefits that extend beyond children themselves to include positive perspectives from caregivers and healthcare providers.

Amidst rising rates of complex, interconnected physical and mental health challenges in paediatric populations^{4,12}, attending to the role and value of play in supporting children's health and wellbeing is more critical than ever. This review highlights that play is not only a tool for alleviating immediate distress but also can contribute to a shift toward preventative, holistic healthcare, where emotional and psychological health are nurtured alongside physical health to support a more person-centred approach to paediatric care.

The evidence shows ways that play can enhance children's healthcare experiences, from specific treatments and procedures to their overall interactions within the healthcare environment. Research consistently highlights how engagement in play can help to reduce anxiety, fear, and distress while fostering trust, joy, and comfort. Importantly, although much of the literature focuses on children in physical healthcare settings, the outcomes frequently reflect mental health benefits, suggesting play's ability to bridge the gap between physical and psychological wellbeing – a separation that has a long legacy in healthcare³⁸. This reinforces the relevance of play in integrated healthcare approaches, which many nations are prioritising³⁹⁻⁴¹ amidst escalating mental health challenges among CYP. The evidence highlights the unique capacity of play to address the emotional and mental aspects of healthcare for CYP, even in challenging circumstances, and calls attention to the evolving perception of what it means to be 'healthy' or 'well' within healthcare spaces.



While play alone does not alter the trajectory of a child's illness, it can profoundly influence their experience of receiving healthcare and their perception of being well amidst health adversity. Play supports positive interactions with their treatment and environment, empowering them to perceive their own health and personhood in ways that promote dignity and resilience. For CYP enduring medical encounters, the goal of play is not to 'trick' children into compliance, but rather to transform distressing experiences in ways that promote dignity and resilience. Play allows children to interact with their treatment in ways that make it more manageable and less daunting, empowering them to maintain a sense of agency. This reduces immediate distress and, critically, has the potential to mitigate long-lasting psychological effects, both for the child in the present and as they develop into the future.

Across the studies included in this review, the wide variety of play types—ranging from structured interventions to unstructured, creative activities—illustrates the adaptability of play in diverse healthcare contexts. The studies encompass a wide range of age groups, with evidence focused on the experiences of CYP from infancy to adolescence and including perspectives from children and the adults who care for and support them in healthcare contexts. This variety highlights play's adaptability to different healthcare contexts, cultural settings, and developmental needs, and the breadth of its benefits for children in diverse healthcare environments. However, the effectiveness of play

in influencing health outcomes is highly context-dependent, with factors such as children's ages, health conditions, and individual preferences playing a role. Though results were broadly and overwhelmingly positive, differences and discrepancies among the results of these papers underscore the importance of delving deeper into children's own perspectives and experiences—not just of the play itself but of their medical encounters as a whole. This would allow for more experience- and needs-based explorations of play, potentially revealing deeper insights than focusing solely on the type of play deemed most effective.

The review also identifies critical gaps in the current evidence base. Research on play in mental health and community healthcare settings is scarce, as is research addressing the specific needs of infants and adolescents. Young children, as well as those who are neurodivergent or non-verbal, are often not included in research about their healthcare experiences generally^{42,43}. Also, CYP who fall at the outer edges of the paediatric age range are not often included in studies about play⁴⁴. In this review, only three studies focused on the play experiences of adolescents: this may be due to the perception that the behaviours or activities they engage in are not explicitly classified as "play" or playful. This is particularly relevant given the increasing recognition of the mental health needs of adolescents in the UK, where integrated healthcare systems aim to address both physical and psychological health^{38,45}.

Another notable gap is the representation of professional and experiential expertise in the design and implementation of play interventions. Across the studies, play activities tended to be adult-led with limited input from children themselves. While measurable and structured, these may lack the responsiveness needed to accommodate children's autonomy and diverse ways of engaging with play. The literature also highlights the inconsistency of inclusion of play professionals, which could be reflective of both research and healthcare landscapes.

To ensure that research is evaluating the ways in which play can be effective in supporting children's health in the real-world circumstances they would experience in healthcare settings, future research must prioritise a deeper understanding of the mechanisms and factors that influence play's effectiveness. For instance, factors such as a child's sense of control over play activities and the quality of adult facilitation may shape the impact of play on health outcomes, and understanding those influences may make interventions more broadly applicable across diverse paediatric healthcare environments.





RECOMMENDATIONS AND CONCLUSIONS

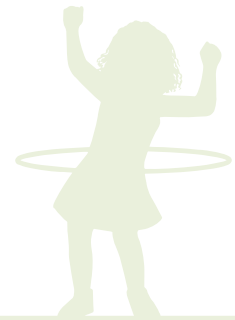
At the time of completion of this review, the UK government is consulting on its policy for health and healthcare ahead of launching a new 10-year health plan for England^{46,47}. This is an opportune moment to reflect on how the healthcare system can best support the needs of children now and in the future. The integration of play offers a tangible, evidence-based way to enhance children's health and wellbeing within this framework.

This review emphasises the timely and globally diverse recognition of the importance of play in the context of children's health. The movement toward a holistic, relational approach to healthcare⁴⁸ acknowledges physical, mental, and emotional dimensions of health, genuine connection between individuals, and recognition of individuals' rights, agency, and capabilities alongside their healthcare needs. Play is a vital element of this approach: it *humanises* healthcare experiences, promotes dignity and resilience, and aligns with an evolving understanding of health as more than the absence of illness^{2,49}.

Looking ahead to the next decade, embedding play as an integral feature of healthcare systems can contribute to mitigating healthcare-related trauma and improving holistic outcomes for children. This is not only about alleviating distress during acute care but also about encouraging wellbeing across preventive, community, and mental health services.

Critically, realising these benefits depends on equipping those who support and care for children's health with a deeper understanding of the importance of play. Without sufficient education for healthcare professionals, caregivers, and policy leaders, play may be overlooked or undervalued, limiting its potential impact to meaningfully engage children in their health and healthcare.

By championing play throughout policy, strategy, and practice, we can ensure that healthcare systems support children as whole persons, addressing their developmental and psychological needs alongside their physical health.



SCOPING REVIEW METHODOLOGY

The scoping review framework outlined by Arksey and O'Malley²⁸ involves five steps: (1) identifying the research question; (2) identifying relevant studies; (3) study selection; (4) charting the data; and (5) collating, summarising and reporting the results. Based on the proposed focus of this review, we composed the following research question: **What does recent research reveal about the connection between play and children's health in healthcare contexts?**

We began by identifying the key concepts within the research question and exploring other relevant literature reviews pertinent to this topic^{24,25} to develop a comprehensive search strategy. With the consultation and support of a medical librarian, we selected five databases that would cover the critical elements of our review: children, healthcare, play, and health. These included PubMed, CINAHL, ERIC, PsycInfo, and Web of Science. Our search terms, seen below, were adapted to the unique criteria of each individual database.

Note

Key terms were combined using a Boolean "AND" operator. To increase the breadth of the search, relevant words and concepts within each key term were included via a Boolean "OR" operator. A truncation function (*) was applied to capture different endings of root words.

The searches were constrained to literature published within the past ten years (2014–2024) in order to maintain focus on recent, relevant literature on this topic. Database searches were conducted in May 2024 and yielded 22,227 results. Records from each database were uploaded to the online record screening tool Covidence.org. The Covidence software removed 3462 duplicate records, leaving a total of 18,765 to be screened.

Population	Children:	(child* OR adolescen* OR teenage* OR (youth OR "young people" OR "young adult") OR infant OR toddler OR (baby OR babies) OR (paediatric OR pediatric))
AND		
Setting	Healthcare:	(healthcare OR "health care" OR (hospital OR hospitals OR hospitaliz* OR hospitalis*) OR clinic* OR medic* OR ward OR (surgery OR surgical) OR "primary care")
AND		
Outcome 1	Play:	((play* OR playthings) OR recreation OR leisure OR activities OR entertainment OR fun OR toys OR games OR (pretend OR imagin*) OR social OR "child life")
AND		
Outcome 2	Health:	(health OR (wellbeing OR wellbeing OR "well being") OR "quality of life" OR "health impact")



Three reviewers (KG, PPDM, KT) screened titles and abstracts of these records, applying the following inclusion criteria:

- A. Published between 2014–2024
- B. Full-text available in English
- C. Peer-reviewed, original research
- D. Pertained to children and young people (0–18 years)
- E. Pertained to healthcare contexts (e.g. hospitals, clinics, general practices, community services)

Articles were excluded if they met these criteria:

- A. Not peer-reviewed
- B. Dissertation or thesis; commentary; conference proceedings; literature reviews
- C. Play was not considered in connection to children's health
- D. Activities were not described as "play"

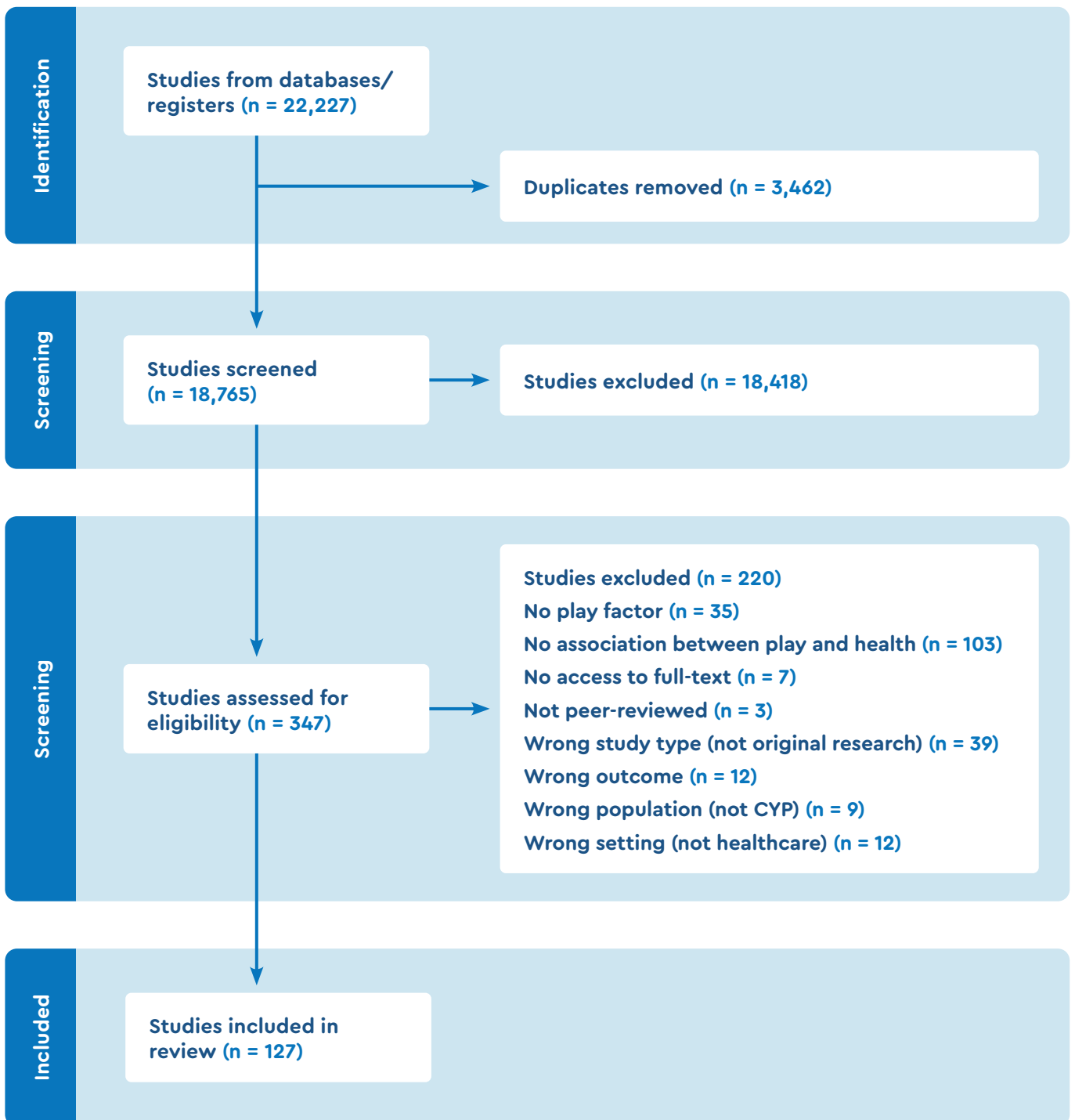


We recognised that removing papers that did not explicitly refer to "play" might exclude studies describing activities that could be considered playful, but we decided against defining 'play' on behalf of the authors and imposing our own interpretation of the term.

Due to the number of papers, consensus checking (with a minimum of two reviewers) was completed on a subset of records in order for them to move on to full-text screening. During this time, the reviewers held three rounds of screening review sessions to establish consistency of applying the inclusion and exclusion criteria and met weekly throughout the screening phase to resolve any uncertainties or conflicts. After title/abstract screening, 18,418 records were excluded, and 347 articles proceeded to full-text screening. The same procedure was applied to full-text screening, where 220 records were excluded.

Data were extracted from the resulting articles. Each study was read in its entirety, and relevant information was input into a table using Microsoft Excel. This included descriptive information about the articles (authors, title, journal, location, year), study parameters (objectives, setting, participants, design, analysis), and play-related details (play factor, clinical relevance, facilitators, relationship to health). Finally, we synthesised the extracted data to map out the scope of data relevant to our research question, considered key ideas that could be generated from the dataset, and assessed what knowledge gaps existed in the evidence base.

PRISMA FLOWCHART



PAPERS INCLUDED IN SCOPING REVIEW

#	Author	Year	Title	Location	Play Element	Connection to Child Health
1	Addarii, F. et al.	2024	Amateur dubbing as a healthcare activity in the pediatric hospital setting: a pilot project	Italy	Music play (dubbing)	Amateur dubbing positively impacted children's wellbeing, quality of life, and socialisation.
2	Al-Yateem, N. et al.	2017	Unstructured play for anxiety in pediatric inpatient care	UAE	General play (toys, games, balloons, colouring books, face painting, Play-Doh®, bubbles, stories)	Significant decrease in anxiety in the play intervention group compared to those without play sessions.
3	Allen, B. et al.	2017	Structured Trauma-focused CBT and unstructured play/ experiential techniques in the treatment of sexually abused children: a field study with practicing clinicians	USA	General play (toys, games, balloons, colouring books, face painting, Play-Doh®, bubbles, stories)	Children who received fewer unstructured play techniques improved at a greater rate than those who received more of these techniques in terms of post treatment stress, dissociation, anxiety, anger, and aggression.
4	Arikan, A. et al.	2020	Active and passive distraction interventions in a pediatric emergency department to reduce the pain and anxiety during venous blood sampling: a randomised clinical trial	Turkey	Toys (passive and active)	Toys used for distraction reduced procedural pain, fear, and anxiety. Active toys were found to be more effective than passive toys.
5	Aydın, G. et al.	2017	The effect of play distraction on anxiety before premedication administration: a randomised trial	Turkey	Toys (Play-Doh®)	Lower anxiety scores post-intervention. Play-Doh® as a distraction helped facilitate the administration of oral midazolam to young children.

6	Ballard, A. et al.	2017	Distraction kits for pain management of children undergoing painful procedures in the emergency department: a pilot study	Canada	Toys (musical instruments, bubbles, puppets, musical animal toys, books, games, cards, stickers)	Significant increase in procedural pain scores from pre- to peri-procedure, followed by a significant decrease from peri- to post-procedure for both groups using distraction kits during procedures. Both parents and nurses found the kits effective for pain control.
7	Barreto Santos, S. et al.	2023	Playing as a strategy in physiotherapy care of hospitalised children under the perception of the companion: a descriptive cross-cross study	Brazil	General play	Play is viewed as an important supportive tool in paediatric physiotherapy. Improves mood, acceptance, and interaction during and after interventions, making care more comprehensive and humanised.
8	Bawaeda, O. et al.	2023	Effectiveness of pop-it therapeutic play on children's anxiety during inhalation therapy in children's wards	Indonesia	Toy (pop-it)	Pop-it therapeutic play was an effective non-pharmacological nursing intervention for reducing anxiety in children during inhalation therapy.
9	Bekar, P. et al.	2022	The effect of using a kaleidoscope during central venous catheter dressing changes on pain and anxiety in children with cancer: a randomised controlled trial	Turkey	Kaleidoscope	Kaleidoscope group showed significantly lower pain and anxiety scores, higher oxygen saturation, and lower heart rate compared to the control group during and after dressing changes.
10	Bharuchi, V. et al.	2024	Effect of play-based intervention on children's mental status and caregiver involvement during hospitalisation: findings from Pakistan	Pakistan	Therapeutic session (developmental, educational play)	Play stimulation significantly improved the mental states of children in acute, special, and critical care. The largest difference pre- to post-intervention was seen in children aged 2–5 years.
11	Bice, A. et al.	2018	Exploring holistic comfort in children who experience a clinical venipuncture procedure	USA	General play (games, toys, child-friendly setting)	Children and caregivers identified amusement and entertainment, such as novelty toys, stuffed animals, screen time, games, and activities, as sources of comfort.
12	Biddiss, E. et al.	2019	Positive distraction in pediatric healthcare waiting spaces: sharing play not germs through inclusive, hands-free interactive media	Canada	Video media (interactive/passive)	Young people preferred shared distractions over personal items: interactive media and an aquarium reduced anxiety, while personal electronic devices and nature videos had little effect.

13	Blackburn, C.	2020	Family members' perceptions of a singing medicine project in a children's hospital	UK	Music (singing games)	Participation in the Singing Medicine project reduces negative emotions and improves wellbeing for children with long-term conditions and their families.
14	Blackburn, C.	2020	'The people in the purple shirts': Froebelian insights to a singing medicine project in a children's hospital	UK	Music (singing games and activities)	Singing Medicine positively impacts children's socio-emotional development by calming or improving mood, general stimulation, and distracting from unpleasant procedures. It empowers children through personal choice and supported learning and development.
15	Bray, L. et al.	2020	The acceptability and impact of the xploro digital therapeutic platform to inform and prepare children for planned procedures in a hospital: before and after evaluation study	UK	Online game (interactive tablet app)	The Xploro intervention reduced procedural anxiety in children and parents and improved children's understanding and involvement in the procedure.
16	Brockington, G. et al.	2021	Storytelling increases oxytocin and positive emotions and decreases cortisol and pain in hospitalised children	Brazil	Storytelling (medical and non-medical); riddles	Both interventions increased oxytocin and decreased cortisol. Stronger effects were seen in the storytelling group, which also showed greater pain reduction and more positive associations with hospitals and healthcare providers.
17	Brown, N. et al.	2014	Play and heal: randomised controlled trial of Ditto TM intervention efficacy on improving re-epithelialisation in pediatric burns	Australia	Online game (app with medical stories/games)	Children in the Ditto group re-epithelialised faster, with lower anxiety, heart rates, and pain during dressing changes compared to the standard practice group.
18	Bruins Slot, J. et al.	2018	Feeling happy and carefree: a qualitative study on the experiences of parents, medical clowns and healthcare professionals with medical clowns	Netherlands	Medical clowns	Clowns bring joy, distraction, and care-free moments through low-key play and activities.
19	Brys, T. et al.	2022	Clown doctors and forensic paediatricians enhance the patient experience at the Royal Children's Hospital in Melbourne	Australia	Medical clowns	For children who felt fear or tension on arrival, meeting the clown doctor reduced these negative feelings. Many healthcare providers agreed that clown doctors helped alleviate children's apprehension.

20	Budhan, J. et al.	2019	The impact of a novel gaming reinforcement system on oral intake outcomes in pediatric feeding therapy: a single case study	USA	Online game (computer)	The game's novelty initially boosted the patient's daily oral intake, but this effect faded over time with no long-term gains.
21	Bulut, M. et al.	2020	The effect of music therapy, hand massage, and kaleidoscope usage on postoperative nausea and vomiting, pain, fear, and stress in children: a randomised controlled trial	Turkey	Toys (kaleidoscope)	Postoperative pain scores were significantly lower in the intervention group as compared to controls, with music therapy and the kaleidoscope method contributing to this difference. The kaleidoscope group showed significantly lower postoperative fear and anxiety levels than the control group.
22	Burns-Nader, S. et al.	2017	Computer tablet distraction reduces pain and anxiety in pediatric burn patients undergoing hydrotherapy: a randomised trial	USA	Online games (tablet, interactive)	Nurses reported less pain in the tablet distraction group compared to controls, though no significant difference was found in self-reported pain. The tablet distraction group had significantly less anxiety during the procedure and returned to baseline afterward, while controls had higher anxiety post-procedure.
23	Caleffi, C. et al.	2016	Contribution of structured therapeutic play in a nursing care model for hospitalised children	Brazil	Therapeutic session (hospital supplies, toys, painting/drawing, dolls)	Therapeutic play sessions foster emotional expression, communication, and enhanced feelings of joy and confidence.
24	Capurso, M. et al.	2020	A low cost, volunteer-based program to prepare children to undergo magnetic resonance imaging without sedation	Italy	Therapeutic session (book, role play, obstacle course, playroom)	The preparation program helped children cope without sedation. All children successfully completed the preparation; over 90% underwent a clinically diagnostic MRI without sedation. Image quality was consistent with similar studies, with no impact from exam duration or age.
25	Carrion-Plaza, A. et al.	2020	HabitApp: new play technologies in pediatric cancer to improve the psychosocial state of patients and caregivers	Spain	Online game (mobile app)	HabitApp increased positive affection, with smiling, laughter, and greater interaction between patients and caregivers, fostering relaxed conversations, storytelling, and enhanced collaboration.

26	Castiglioni, M. et al.	2022	Play-based activities with a coderbot robot on a pediatric ward: a case study	Italy	Robot	Children felt happier, stronger, and more engaged after participating in the robot activity.
27	Clausen, N. et al.	2021	The use of tablet computers to reduce preoperative anxiety in children before anesthesia: a randomised controlled study	Denmark	Online games (tablet)	Reduction in pre-operative anxiety of young children undergoing elective day-case surgery. The intervention did not affect the occurrence of emergence delirium or pain scores.
28	Crane, J. et al.	2018	Child's play: the role of play in mitigating the fear of death among pediatric palliative care team patients, families, and caregivers	USA	General play (games, toys, socialising, dancing)	Play and humour offer brief moments of escape, helping patients, families, and healthcare providers momentarily shift focus from anguish to light-hearted interactions.
29	da Silva, J. et al.	2016	Using therapeutic toys to facilitate venipuncture procedure in preschool children	Brazil	Medical play (dolls, puppets)	Dolls and puppets used during venipuncture helped calm children and improve their cooperation and acceptance.
30	da Silva, L. et al.	2015	Rescuing the pleasure of playing of child with cancer in a hospital setting	Brazil	General play	Play promotes continuous development and improves quality of life.
31	Dadeya, S. et al.	2016	Television video games in the treatment of amblyopia in children aged 4-7 years	India	Video game	Both groups showed significant improvement in visual acuity, with the video game group showing significantly better results.
32	Dantas, F. et al.	2016	Use of therapeutic play during intravenous drug administration in children: exploratory study	Brazil	Therapeutic session (medical equipment, doll)	After the play session, children who had resisted IV medication became more relaxed, cooperative, and confident.
33	Darko, E. et al.	2024	Play for hospitalised children: a qualitative enquiry of behaviour and motivation of nurses in a secondary level healthcare setting in Ghana	Ghana	General play (books, pretend play, playroom environment, television, dancing, dolls, art, storytelling)	Nurses perceived play as crucial for children's growth, wellbeing, and happiness, as it alleviates anxiety and fear, fosters communication, and supports recovery and overall wellbeing in hospitalised children.
34	DeCosta, P. et al.	2022	Playful communication and care: exploring child-centred care of young children with type 1 diabetes through the framework of zone of proximal development	Denmark	General play (playroom, toy rewards, humour, hospital clowns)	Playful communication helps address children's emotional needs, encourages participation, and promotes pain relief, fear and anxiety reduction, tension diffusion, and procedural compliance.

35	Depianti, J. et al.	2014	Nursing perceptions of the benefits of ludicity on care practices for children with cancer: a descriptive study	Brazil	General play	Play improves coping, increases understanding, and strengthens relationships and trust between the child and healthcare professional, while also alleviating pain.
36	Di Riso, D. et al.	2020	Associations between pretend play, psychological functioning and coping strategies in pediatric chronic diseases: a cross-illness study	Italy	Pretend play with toys (animals, objects)	Correlations between play, coping, and adjustment problems were reported for children with chronic diseases. Symbolic play helps chronically ill children express emotions, aiding both children and clinicians in understanding and coping with chronic conditions.
37	Dowler, L.	2016	Can improvised somatic dance reduce acute pain for young people in hospital?	UK	Dance (movement, objects)	The majority of CYP experienced a significant reduction in acute pain during and after somatic dance sessions, with 80% reporting over a 50% reduction. CYP reported feeling better and relaxed, including those whose pain scores remained unchanged.
38	Dwairej, D. et al.	2020	Video game distraction and anesthesia mask practice reduces children's preoperative anxiety: A randomised clinical trial	Jordan	Video game	The intervention group had lower mean anxiety scores, reporting a significant decline in anxiety from baseline to transfer to the operating room and no significant increase at anaesthesia induction. Control group showed a significant rise in anxiety at both timepoints.
39	ErDOS, S. et al.	2023	The impact of virtual reality (VR) on psychological and physiological variables in children receiving chemotherapy: a pilot cross-over study	Hungary	Online game (VR, interactive/ personal mobile game)	Interactive VR play boosted happiness and joy more than mobile play, with both reducing anxiety. No significant differences in heart rate or blood pressure.
40	Fazelniya, Z. et al.	2017	The impact of an interactive computer game on the quality of life of children undergoing chemotherapy	Iran	Online game (computer)	Children in the intervention group showed higher quality of life scores immediately after playing the game and at 1-month follow-up, with significant improvements from baseline to both timepoints.

41	Fontoura, R. et al.	2023	Design for wellbeing in hospital routines for paediatric cancer treatment	Brazil	Medical toys (Playmobil® hospital; stuffed animal)	The play intervention allowed children to socialise on their own terms, communicate their emotions, and enhance their overall healthcare experience.
42	Ford, K. et al.	2014	More than just clowns – clown doctor rounds and their impact for children, families and staff	Australia	Clown doctors (general fun, laughter, play)	Clown doctors helped mitigate the negative effects of hospitalisation by bringing fun, laughter, and empowerment to children, transforming moods and situations.
43	Forouzandeh, N. et al.	2020	The effect of interactive games compared to painting on preoperative anxiety in Iranian children: a randomised clinical trial	Iran	Toys (games, Play-Doh®, blocks, puzzles, painting)	Painting and interactive games reduced children's pre-operative anxiety, with the painting group showing slightly lower mean anxiety scores than the interactive game group.
44	Gazestan, E. et al.	2020	The effect of group play therapy on anxiety in children diagnosed with leukemia	Iran	Therapeutic sessions (art, storytelling, games, pretend play, medical equipment)	Group play therapy reduced social anxiety, separation anxiety, harm avoidance, and physical symptoms in children with leukaemia.
45	Gillard, A.	2019	Outcomes of a hospital-based recreation program	USA	Therapeutic sessions (crafts, games, activities)	Improvements in patients' positive affect and sadness, with fewer reports of changes in socialising or physical pain. Parents, caregivers, and staff noted increased activity, communication, and willingness to participate in medical activities.
46	Gold, J. et al.	2021	"Doc McStuffins: doctor for a day" virtual reality (DocVR) for pediatric preoperative anxiety and satisfaction: pediatric medical technology feasibility study	USA	Online game (VR, interactive)	Patients using DocVR showed a significant decrease in anxiety and increased positive affect, with many reporting feeling more comfortable and less scared.
47	Gold, K. et al.	2014	Parents' perceptions of play-therapeutic interventions to improve coping strategies of liver-transplanted children: a qualitative study	Germany	Therapeutic sessions (drawing, crafting, music, physical activity, medical role play and toys)	Parents viewed play-therapeutic interventions as key to improving their children's psychological health and helping them develop new coping skills for medical stressors.

48	Golitaleb, M. et al.	2023	Comparing the effect of music and puzzle-solving on anxiety before surgery in children: a randomised clinical trial	Iran	Online game (puzzles, music)	Both music therapy and puzzle-solving reduced anxiety in children before tonsillectomy, with the lowest anxiety scores reported in the music therapy group.
49	Götte, M. et al.	2014	Experience of barriers and motivations for physical activities and exercise during treatment of pediatric patients with cancer	Germany	Exercise sessions (ball games, console games, sports, free play)	Some patients reported barriers to play in the programme, as it reminded them of limitations or made it feel "not fun". Others found it enjoyable, distracting, and uplifting.
50	Goyel, V. et al.	2022	Evaluation of different pre-treatment behaviour modification techniques in 4-7-year olds: a randomised controlled trial	India	Medical play (dental toys, Play-Doh®, role play)	Children who participated in game-based interventions showed reduced pulse rates and blood pressure after treatment. Physically interactive games were particularly effective in reducing anxiety and increasing cooperation.
51	Günay, U. et al.	2022	The effects of the activity of making jewelry from beads on the anxiety levels of children with cancer: a randomised controlled study	Turkey	Jewellery-making	Jewellery-making reduced state and trait anxiety in children with cancer. The intervention group had lower state anxiety scores after the session compared to the control group.
52	Hayhoe, S. et al.	2018	Reduction of postanesthetic pediatric distress: a coordinated approach	UK	Playroom	Children who spent time in a hospital playroom and used play as a distraction experienced reduced emergence distress after anaesthesia.
53	Hoag, J. et al.	2022	Playing with a purpose: the impact of therapeutic recreation during hospitalisation	USA	Recreation (physical activity, board/card games, video games, arts & crafts, socialising)	Children in the intervention group reported better sleep, more positive affect, and less mood disturbance. However, physical activity and peer support did not increase in the therapeutic recreation group.
54	Hsieh, H. et al.	2021	Interactive floor projection games might help child health in the pediatric oncology ward	Taiwan	Electronic games (interactive)	Participation in interactive floor projection games significantly improved behaviour and mental health scores. There was no improvement in physical or psychosocial summary scores.

55	Hsieh, R. et al.	2016	The impact of short-term video games on performance among children with developmental delays: a randomised controlled trial	Taiwan	Video games (movement based, interactive)	Short-term interactive video game play, combined with traditional rehabilitation, improved the physical health of children with developmental delays.
56	Hsu, M. et al.	2022	Effectiveness of virtual reality interactive play for children during intravenous placement: a randomised controlled trial	Taiwan	Online games (VR/interactive)	The VR interactive play intervention, including instructional and emotional catharsis sessions, effectively reduced pain and fear in school-aged children during IV placement.
57	Inan, G. et al.	2019	The impact of 3 different distraction techniques on the pain and anxiety levels of children during venipuncture: a clinical trial	Turkey	Video games; TV/cartoons; social interaction with parents	The lowest pain and anxiety scores were observed in the video game group during venipuncture. Cartoon movies and parent verbal interaction also reduced pain and anxiety, though less effectively.
58	Isler, A. et al.	2014	Complementary and alternative approaches used by parents of children with epilepsy on epilepsy management.	Turkey	General play (toys, games, sports, drawing, socialising, music, TV, physical activity)	Children with epilepsy coped by looking after pets, listening to music, watching TV, playing games, praying, and spending time with friends.
59	Karaca, T. et al.	2022	The effect of music-moving toys to reduce fear and anxiety in preschool children undergoing intravenous insertion in a pediatric emergency department: a randomised clinical trial	Turkey	Toy (musical animal)	Toy intervention reduced fear and anxiety, but results were not significant compared to the treatment-as-usual group. No significant differences were found in fear, anxiety scores, physiological parameters, or crying time between the intervention and control groups.
60	Kelada, L. et al.	2021	Evaluation of an in-hospital recreation room for hospitalised children and their families	Australia	Playroom (games, videogames, arts and crafts, pretend play, imagination, musical/literary/game events)	Parents reported that recreation rooms provide crucial support and respite, especially for distressed families or those with children facing lower psychosocial and physical functioning.
61	Kerimoglu Yildiz, G. et al.	2022	A tablet game or training booklet? Two methods for evaluating symptom management and quality-of-life of children receiving chemotherapy	Turkey	Online game (app, medical education); booklet (cartoons, activities)	Both the booklet and game interventions reduced symptom frequency, symptom severity, and psychological distress, as well as physical distress post-intervention. The game had a greater impact on improving quality of life.

62	Khodashenas, E. et al.	2017	The effect of an aerobic exercise program on the quality of life in children with cancer	Iran	Exercise program (physical activity, play)	Children in the exercise program intervention group reported better quality of life, particularly in terms of pain.
63	Kirkan, Ç. et al.	2023	Effect of therapeutic play using a toy nebuliser and toy mask on a child's fear and anxiety levels	Turkey	Therapeutic session (medical toys, animal dolls)	Therapeutic play reduced fear and anxiety in children, while scores increased in those who did not receive the intervention.
64	Kleye, I. et al.	2021	Children's individual voices are required for adequate management of fear and pain during hospital care and treatment	Sweden	General play (toys, games, arts and crafts, electronics, TV, socialising, child-friendly decor)	Children identified playful resources and aspects of hospitalisation that help them manage fear and pain during needle procedures.
65	Knutz, E. et al.	2015	Why health care needs design research: broadening the perspective on communication in pediatric care through play	Denmark	Online game	The game provided a way for children to express their emotions and perceived experiences.
66	Kocherov, S. et al.	2016	Medical clowns reduce pre-operative anxiety, post-operative pain and medical costs in children undergoing outpatient penile surgery: a randomised controlled trial	Israel	Medical clowns (magic, music, jokes, games, puppets, bubbles)	Patients with a clown as part of the medical team showed less anxiety before and after surgery. They required less time for anaesthesia induction, and their overall time in the operating room was shorter.
67	Kostak, M. et al.	2021	The effectiveness of finger puppet play in reducing fear of surgery in children undergoing elective surgery: a randomised controlled trial	Turkey	Puppets	Children in the finger puppet play group experienced significantly less fear entering the surgical room and had lower post-operation fear scores compared to the control group.
68	Kumar, A. et al.	2019	Perioperative anxiety and stress in children undergoing congenital cardiac surgery and their parents: effect of brief intervention- a randomised control trial	India	Toys, games, videos	Interventions with toys, funny videos, and games before heart surgery reduced anxiety, stress, and post-operative pain. Children in the intervention group had better moods and lower serum cortisol levels post-surgery.

69	Kurudirek, F. et al.	2020	Effects of therapeutic clowning on pain and anxiety during intrathecal chemotherapy in Turkey	Turkey	Medical clowns	Children who had a clowning session before their IT line insertion reported less anxiety and pain afterward.
70	Larsen, M. et al.	2022	The importance of an outdoor playground for children with epilepsy and their family during and after hospitalisation: a qualitative study of parents' experiences	Denmark	Outdoor playground	Parents reported that playground time helped children cope, feel safe and in control, maintain a sense of normalcy, make social connections, improve mood, boost self-esteem, and enjoy continued physical activity.
71	Li, W. et al.	2016	Play interventions to reduce anxiety and negative emotions in hospitalised children	China	Therapeutic session (puppets, blocks, games)	Children who received play interventions showed less negative emotional behaviour and lower anxiety compared to those who received standard care. Most children reported that play helped reduce anxiety by increasing their knowledge about their illness, familiarising them with medical procedures, and having fun.
72	Liu, M. et al.	2022	The ameliorating role of a playful situational game intervention in school-aged children undergoing ophthalmic surgeries: a randomised controlled trial	China	Online game (computer, interactive)	Children who participated in the game intervention showed less post-operative behaviour change and lower anxiety at OR admission and post-surgery. They were more compliant during anaesthesia induction and less agitated during awakening.
73	Liu, P. et al.	2018	The effectiveness of transport in a toy car for reducing preoperative anxiety in preschool children: a randomised controlled prospective trial	China	Toys (ride-on car)	Children in riding in the toy car had lower anxiety at all stages, showing similar effects to oral midazolam. Toy car transport significantly reduced preoperative anxiety, especially before anaesthesia induction.
74	Loftin, S.	2022	Child-centered play therapy and chronic illness with outcome data: a retrospective case study	USA	Therapeutic play session (arts, dolls, dinosaurs/dragons, Play-Doh®, blocks, medical toys)	Participation in play therapy led to significant improvements in all areas of health-related quality of life and the ability to engage in medical treatment. It supported both health progress and social-emotional functioning.

75	Longobardi, C. et al.	2019	Soap bubbles as a distraction technique in the management of pain, anxiety, and fear in children at the paediatric emergency room: a pilot study	Italy	Bubbles	Children who were distracted with bubbles experienced a significant reduction in pain perception before the medical examination and less fear before and after the examination.
76	Marques da Rosa, V. et al.	2022	Playful interventions to promote the subjective wellbeing of pediatric cancer inpatients during laboratory and imaging exams: a qualitative study	Brazil	Pretend play (hospital-theme dolls, toys)	Playful interventions, such as toys and games that are immersive or distracting or provide positive reinforcement and impact children's wellbeing during medical exams.
77	Maru, V. et al.	2023	Influence of pretreatment exposure to pediatric dental care using the "tiny dentist" game on 4-7 years old children's pain and anxiety: a parallel randomised clinical trial	India	Online game (mobile app)	The video game group had lower heart rates during injection, tooth preparation, and endodontic procedures compared to others.
78	Matthyssens, L. et al.	2020	A pilot study of the effectiveness of a serious game CliniPup® on perioperative anxiety and pain in children	Belgium	Online game/serious game (tablet)	Children who played the CliniPup® game one week before surgery showed a significant reduction in pre-operative anxiety, but no change at other timepoints.
79	Melvin, G. et al.	2023	The impacts of a clown doctor program on an adolescent psychiatric unit: a mixed methods investigation	Australia	Clown doctors (laughter, fun, humour therapy, jokes, songs, music, magic)	Adolescents reported increased fun, improved mood, and better feelings after sessions with clown doctors. Clown doctors observed positive impacts, including fun, a better atmosphere, and the success of the visit.
80	Messina, M. et al.	2014	Preoperative distraction in children: hand-held videogames vs clown therapy	Italy	Medical clowns (physical games, video games, movies)	There was a positive relationship between lower anxiety levels in children undergoing surgery and clown therapy during anaesthesia induction, compared to those who played on their own.
81	Moerman, C. et al.	2021	Using social robot PLEO to enhance the wellbeing of hospitalised children	Netherlands	Toy robot	Most children interacted with PLEO, showing behaviours like hugging and exploring, which promoted relaxation and engagement.

82	Mohammadi, A. et al.	2017	Effect of play-based occupational therapy on symptoms of hospitalised children with cancer: a single-subject study	Iran	Toys, games, socialisation, environment	Play-based occupational therapy reduced pain, anxiety, and fatigue in a child with cancer.
83	Mohammadi, A. et al.	2021	The effect of play-based occupational therapy on symptoms and participation in daily life activities in children with cancer: a randomised controlled trial	Iran	Toys (games, blocks, arts and crafts, dolls, puppets)	Play-based occupational therapy reduced pain, anxiety, and fatigue by improving distress management and disease adjustment in hospitalised children with cancer. The intervention group showed a greater reduction in these symptoms compared to controls.
84	Moore, E. et al.	2015	The effect of directed medical play on young children's pain and distress during burn wound care	USA	Therapeutic session (medical equipment, teaching puppet/doll)	Children who participated in directed medical play experienced lower distress during dressing changes compared to those who received standard preparation.
85	Nagoya, Y. et al.	2017	Pediatric cancer patients' important end-of-life issues, including quality of life: a survey of pediatric oncologists and nurses in Japan	Japan	General play	Play and learning were identified as essential quality of life features in end-of-life care.
86	Navitha, K. et al.	2023	Effectiveness of family centered art intervention on anxiety among hospitalised children in a tertiary care hospital, Mangaluru, India: a quasi-experimental study	India	Arts and crafts	Family art intervention significantly reduced anxiety in children.
87	Nordström, B. et al.	2023	Physio- and occupational therapists view of the place of play in re/habilitation: a Swedish perspective	Sweden	General play	Physio- and occupational therapists viewed play as a valuable intervention for improving body functions and enhancing children's physical conditions.
88	Ofir, S. et al.	2016	The therapy beneath the fun: medical clowning during invasive examinations on children	Israel	Medical clowns	Medical clowning during invasive exams was therapeutic, using theatrical tools to empower children, reverse roles, reframe situations, and build a therapeutic alliance.

89	Oluç, T. et al.	2023	The effect of a hand puppet-based therapeutic play for preschool children on the fear and pain associated with blood collection procedure	Turkey	Puppets	Therapeutic play with a hand puppet reduced fear and pain during the blood collection process.
90	Orhan, E. et al.	2017	The effects of pre-intervention training provided through therapeutic play on the anxiety of pediatric oncology patients during peripheral catheterisation	Turkey	Medical toys (educational colouring book, ChemoDuck)	Training with therapeutic play before procedures reduced children's anxiety and state anxiety levels associated with venous catheterisation.
91	Ortiz, G. et al.	2019	Impact of a child life and music therapy procedural support intervention on parental perception of their child's distress during intravenous placement	USA	Therapeutic session (role play, medical equipment, teaching doll, musical instruments)	Play interventions supported healthy coping and minimised distress during IV placement.
92	Paladino, C. et al.	2014	Therapeutic play in preparing for surgery: behavior of preschool children during the perioperative period	Brazil	Medical toys (dolls, medical equipment, everyday objects)	Surgery preparation with therapeutic play was enjoyable for most children, who actively participated, asked questions, and repeated the play after hearing the story. Most children entered the operating room calmly, cooperated during anaesthesia, and woke up peacefully after surgery.
93	Pérez-Duarte Mendiola, P.	2023	How to communicate with children, according to health play specialists in the United Kingdom: a qualitative study	UK	Therapeutic play sessions	Health Play Specialists confirm the benefits and importance of play for chronically ill children. Play enables communication, teaching, and emotional support; it promotes understanding, engagement, and fun; it combats stigmatisation, anxiety, and fear.
94	Phelan, I. et al.	2023	Playing your pain away: designing a virtual reality physical therapy for children with upper limb motor impairment	UK	Online games (VR/ interactive)	Children in the VR intervention group (archery and climbing) reported less pain and showed significant improvements in upper limb movement compared to controls.

95	Pourteimour, S. et al.	2021	The effectiveness of the robotic game kit on anxiety among hospitalised preschool children: a non-randomised controlled trial	Iran	Robot gaming/building	Robotic game kits significantly reduced anxiety scores in hospitalised children.
96	Preyde, M. et al.	2017	Adolescents' evaluation of music therapy in an inpatient psychiatric unit: a quality improvement project	Canada	Music therapy (improvisation, song-singing, instrumental role-playing, lyric analysis, artistic media production)	Youth reported that music therapy helped elevate their mood, reduce anxiety, and improve communication and interaction.
97	Rantala, A. et al.	2020	Health specialists' views on the needs for developing a digital gaming solution for paediatric day surgery: a qualitative study	Finland	Online game	Health specialists believe digital gaming can help children overcome fear and anxiety, distract them during procedures, and serve as a personal pain meter.
98	Rasheed, M. et al.	2021	Development and feasibility testing of a play-based psychosocial intervention for reduced patient stress in a pediatric care setting: experiences from Pakistan	Pakistan	Therapeutic sessions (games, toys)	Play-based sessions helped distract children from pain, encourage calm, and reduce overall anxiety, according to parents and physicians.
99	Rich, V. et al.	2024	Captains on call: a qualitative investigation of an intervention to support children with retinoblastoma undergoing regular eye examinations.	Australia	Therapeutic sessions (music, games)	Reframing traumatic medical experiences, empowering children through play, and adopting a family-centred approach can improve wellbeing.
100	Rodríguez-Rodríguez, R. et al.	2023	The value of music therapy in the expression of emotions in children with cancer	Spain	Music (playing percussion instruments, keyboard, improvising, singing, listening to songs)	Music therapy helped children with cancer express their emotions and improve their overall emotional wellbeing, as reported by both the children and parents.
101	Russo, L. et al.	2022	Feasibility of a VR intervention to decrease anxiety in children with tumors undergoing CVC dressing	Italy	Online game (VR, interactive)	VR games significantly reduced distress levels but did not significantly diminish anxiety scores during the central venous catheter dressing procedure.

102	Sakizci Uyar, B. et al.	2021	Which is good for pre-operative anxiety? Midazolam, video games or teaching with cartoons: a randomised trial	Turkey	Cartoons (medical-based); online games (tablet app)	Playing video games was more effective than midazolam or watching the cartoon in reducing anxiety in the pre-operative holding area. Both video games and midazolam reduced anxiety when entering the operating room, but the cartoon had no effect on anxiety at this stage.
103	Shahrbabaki, R. et al.	2023	Effectiveness of listening to music and playing with LEGO® on children's postoperative pain	Iran	Music; LEGO®	Children in the intervention group showed a decline in pain intensity scores as compared to controls, where pain intensity increased after an initial decrease.
104	Silva, S. et al.	2017	Influence of therapeutic play on the anxiety of hospitalised school-age children: clinical trial	Brazil	Therapeutic sessions (role play, medical equipment, dolls)	There was no difference between the groups. Most children reported low anxiety.
105	Soares, A. et al.	2014	The use of playing by the nursing staff on palliative care for children with cancer	Brazil	General play	Nurses reported that play helps calm children and relieve tension in palliative care settings.
106	Sposito, A. et al.	2016	Puppets as a strategy for communication with Brazilian children with cancer	Brazil	Puppets (crafting and pretend play)	The use of puppets helped children express their feelings and improve verbal communication.
107	Stunden, C. et al.	2021	Comparing a virtual reality-based simulation app (VR-MRI) with a standard preparatory manual and child life program for improving success and reducing anxiety during pediatric medical imaging: randomised clinical trial	Canada	Online game (app, VR interactive)	There were no clinically significant differences in anxiety levels between the VR-MRI and other care methods. Despite low anxiety reported by participants, many were still unsuccessful in the simulated MRI. No significant differences were found in assessment times across groups.

108	Suzan, O. et al.	2020	Effect of puppet show on children's anxiety and pain levels during the circumcision operation: a randomised controlled trial	Turkey	Puppets	An intraoperative puppet show effectively reduced intra- and post-operative pain during awake circumcision under local anaesthesia, compared to controls. Anxiety levels were also similarly reduced, with both groups showing a decrease in pain over time.
109	Teksoz, E. et al.	2017	The impact of a creative play intervention on satisfaction with nursing care: a mixed-methods study	Turkey	Crafting (toy-making with medical equipment)	Nurses reported that creative play interventions, such as toy-making activities, supported children's development during hospitalisation and helped reduce their fear and anxiety.
110	Thabrew, H.	2021	A cognitive behavioral therapy-, biofeedback-, and game-based eHealth intervention to treat anxiety in children and young people with long-term physical conditions (Starship Rescue): co-design and open trial	New Zealand	Online game (app)	Participants in the game-based intervention reported a sustained decrease in anxiety and improved quality of life.
111	Ugucu, G. et al.	2022	Effects of cartoon watching and bubble-blowing during venipuncture on pain, fear, and anxiety in children aged 6–8 years: a randomised experimental study	Turkey	Cartoons, bubbles	Cartoon watching, a passive distraction method, was more effective than bubble-blowing, an active distraction method, in reducing venipuncture-induced pain, anxiety, and fear.
112	Ullán, A. et al.	2014	The effect of a program to promote play to reduce children's post-surgical pain: with plush toys, it hurts less	Spain	Therapeutic session	Children in the experimental group, whose parents received specific play materials and instructions for post-surgical play, had lower pain scores at all three post-surgical measurements compared to controls, whose parents received standard hospital care.
113	Uluhan, C. et al.	2024	Effects of the re-mission video game on fatigue and quality of life levels of adolescents diagnosed with cancer: a randomised controlled trial	Turkey	Video game	Adolescents in the experimental group reported lower fatigue. Their quality of life significantly improved compared to controls, with improvements in physical, emotional, functional, and social wellbeing.

114	Ünver, S. et al.	2020	Effectiveness of a group game intervention in reducing preoperative anxiety levels of children and parents: a randomised controlled trial	Turkey	Game (Jenga)	Children in the experimental group experienced a significant decrease in anxiety levels compared to the control group.
115	Ünver, S. et al.	2021	The effects of game intervention on postoperative anxiety and pain levels in children: a randomised controlled study	Turkey	Game (Jenga)	Playing Jenga reduced anxiety and pain levels in children post-operation.
116	Vaduva, L. et al.	2019	A study of the efficiency of music therapy, art and play therapy on hospitalised children diagnosed with chronic illnesses	Romania	Therapeutic sessions (music playing, singing; bubbles, balloons, toys, instruments, arts and crafts)	Music and play therapies improved the emotional wellbeing of children with chronic illnesses by increasing joy and peacefulness, reducing agitation, and enhancing engagement, socialisation, and expression.
117	van der Riet, P. et al.	2017	Student nurses experience of a "fairy garden" healing haven garden for sick children	Thailand	Fairy garden (play environment)	Student nurses found that the Fairy Garden Healing Haven had a calming effect on children and met their physical, emotional, and spiritual needs.
118	van der Riet, P. et al.	2020	Hospitalised children's experience of a fairy garden in northern Thailand	Thailand	Play environment, drawing	Drawing in the Fairy Garden helped relieve children's headaches, increase focus, and made them feel relaxed and happy.
119	Vercher, P. et al.	2016	The effectiveness of incorporating a play-based intervention to improve functional mobility for a child with relapsed acute lymphoblastic leukaemia: a case report	USA	Therapeutic sessions (pretend play, physical activity)	Play-based physical therapy improved walking distance, lower extremity strength, and activity endurance, and less assistance was needed during transfers.
120	Wang, Y. et al.	2023	Community-based pediatric palliative care: how services support children's and families' quality of life	USA	General play	Play helped to improve the quality of life and psycho-emotional wellbeing of children and their families.
121	West, N. et al.	2020	Reducing preoperative anxiety with child life preparation prior to intravenous induction of anesthesia: a randomised controlled trial	Canada	Therapeutic session	Child Life preparation before day case surgery reduced anxiety during IV placement in 6- to 10-year-olds, but not in 3- to 5-year-olds.

122	Whu, Y. et al.	2023	Children's perceptions of interactive virtual-reality interventions implemented before and after intravenous cannulation	Taiwan	Online game (VR, interactive)	Children found VR interventions helpful for reducing fear and anxiety during intravenous cannulation and reported that the experience supported psychological healing.
123	Wong, C. et al.	2018	Effects of therapeutic play on children undergoing cast-removal procedures: a randomised controlled trial	China	Dolls; tactile stimulation; singing	Therapeutic play (e.g., distraction and doll play) reduced anxiety and negative emotions in children during cast removal, with improvements seen in both younger (3-7 years) and older (8-12 years) children.
124	Yaz, Ş. et al.	2024	The effect of vibrating cold application and puppet use on pain and fear during phlebotomy in children: a randomised controlled study	Turkey	Toys (standard and medical toy)	Nurses reported that 'Bee Buzzy' effectively reduced pain during phlebotomy, but not fear. Parents reported that both Bee Buzzy and puppets reduced pain and fear.
125	Zengin, M. et al.	2021	The effects of a therapeutic play/play therapy program on the fear and anxiety levels of hospitalised children after liver transplantation	Turkey	Therapeutic session (dolls, animals, singing, puzzles, computer games, videos; medical equipment and dolls)	Children showed decreased fear and anxiety after the therapeutic play session.
126	Zhao, R. et al.	2022	A therapeutic play program for children undergoing kidney biopsy with local anesthesia: construction and feasibility evaluation	China	Therapeutic session (storytelling, role-play, medical equipment play, picture book about Kidney biopsy)	Nephrologists, children, and parents reported that therapeutic sessions helped reduce anxiety and set realistic pain expectations for children undergoing kidney biopsy with local anaesthesia.
127	Zoccolillo, L. et al.	2015	Video-game based therapy performed by children with cerebral palsy: a cross-over randomised controlled trial and a cross-sectional quantitative measure of physical activity	Italy	Video game (interactive)	Xbox-based video game therapy with Kinect improved upper limb function, increased limb movements, and trunk accelerations in children with cerebral palsy. It did not impact hand abilities.

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